

U.S. DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
ENVIRONMENTAL ASSESSMENT
for
IMPLEMENTATION OF A LIGHT GOOSE HUNTING
PLAN FOR SQUAW CREEK NATIONAL WILDLIFE

Abstract: The Squaw Creek National Wildlife Refuge, comprising 7,441 acres, was established in 1935 as a refuge and breeding ground for migratory birds and other wildlife. The refuge is located in Holt County in northwestern Missouri, along the east side of the Missouri River floodplain. The U.S. Fish and Wildlife Service is proposing to implement a guided light goose hunt, during the spring light goose conservation order hunting season, on a 236 acre portion of the refuge. The purpose of this hunt is to facilitate an increase in the harvest of the mid-continent population of light geese while providing quality recreational hunting opportunities on the refuge. Alternatives considered in this proposal include: (A) Open a Portion of the Refuge to Guided Hunting During the Spring Light Goose Conservation Order Hunting Season, (B) No action, (C) Open a Portion of the Refuge to Unlimited Public Hunting During the Spring Light Goose Conservation Order Hunting Season, and (D) Open a Portion of the Refuge to Limited Public Hunting During the Spring Light Goose Conservation Order Hunting Season. Alternative (A) was the preferred alternative based on the refuge's need to control access in order to maximize the light goose harvest while providing a quality hunting experience for hunt participants at a minimal cost to the refuge.

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Table of Contents

1. Purpose and Need for Action	6
1.1 Purpose	6
1.2. Need	6
1.3. Decisions that Need to be Made	6
1.4. Background	6
2. Alternatives, Including the Proposed Action	7
2.1 Alternatives not Considered for Detailed Analysis	7
2.2 Alternatives Carried Forward for Detailed Analysis	8
2.2.1 Alternative A (Proposed Action)	8
2.2.2 Alternative B (No Action)	8
2.2.3 Alternative C	8
2.2.4 Alternative D	9
2.3 Summary of Alternative Actions (Table)	10
3. Affected Environment	10
3.1 Physical Characteristics	11
3.2 Biological Environment	11
3.2.1 Habitat/Vegetation	11
3.2.2 Listed, Proposed, and Candidate Species	11
3.3.3 Other Wildlife Species	12
3.3 Land Use	12
3.4 Cultural/Paleontological Resouces	13
3.5 Local Socio-economic Conditions	13

4. Environmental Consequences	13
4.1. Alternative A (Proposed Action)	13
4.1.1 Habitat Impacts	13
4.1.2 Biological Impacts	13
4.1.3 Listed, Proposed, and Candidate Species	14
4.1.4 Cultural Resources	14
4.1.5 Environmental Justice	14
4.1.6 Public Health and Safety	15
4.1.7 Cumulative Impacts	15
4.1.8 Public Use	19
4.1.9 Socioeconomics	20
4.1.10 Public Perception	20
4.2. Alternative B (No Action)	20
4.2.1 Habitat Impacts	20
4.2.2 Biological Impacts	20
4.2.3 Listed, Proposed, and Candidate Species	20
4.2.4 Cultural Resources	21
4.2.5 Environmental Justice	21
4.1.6 Public Health and Safety	21
4.2.7 Cumulative Impacts	21
4.2.8 Public Use	23
4.2.9 Socioeconomics	23
4.2.10 Public Perception	23

4.3. Alternative C	23
4.3.1 Habitat Impacts	23
4.3.2 Biological Impacts	23
4.3.3 Listed, Proposed, and Candidate Species	24
4.3.4 Cultural Resources	24
4.3.5 Environmental Justice	24
4.1.6 Public Health and Safety	24
4.3.7 Cumulative Impacts	24
4.3.8 Public Use	29
4.3.9 Socioeconomics	29
4.3.10 Public Perception	29
4.4 Alternative D	30
4.4.1 Habitat Impacts	30
4.4.2 Biological Impacts	30
4.4.3 Listed, Proposed, and Candidate Species	30
4.4.4 Cultural Resources	30
4.4.5 Environmental Justice	31
4.1.6 Public Health and Safety	31
4.4.7 Cumulative Impacts	31
4.4.8 Public Use	35
4.4.9 Socioeconomics	35
4.4.10 Public Perception	36
4.5 Summary of Environmental Consequences by Alternative (Table)	37

5. List of Preparers	40
6. Consultation and Coordination with the Public and Others	40
7. Public Comment on Draft EA/EIS and Response	40
8. References Cited	41
Figure 1	42
Squaw Creek NWR Light Goose Hunt EA Signature Page	43
Appendix 1 Squaw Creek National Wildlife Refuge Light Goose Hunting Plan	
Appendix 2 Intra-Service Section 7 Biological Evaluation Form	

1. Purpose and Need for Action

1.1 Purpose

The U.S. Fish and Wildlife Service is proposing to implement a light goose hunting plan on Squaw Creek National Wildlife Refuge (SCNWR) during the spring light goose conservation order hunting season. The purpose of this hunt is to increase the total harvest of the mid-continent population of light geese while providing wildlife dependant recreation on the refuge.

1.2 Need

The following needs have been identified relative to the implementation of the SCNWR Light Goose Hunting Plan:

- There is a need to decrease the current mid-continent population of light geese in order to reduce catastrophic destruction of their arctic breeding ground habitat.
- There is a need for quality, wildlife dependant, public outdoor recreation that is consistent with the Refuge's purpose.

1.3 Decisions that Need to be Made

The Regional Director of the Great Lakes/Big Rivers Region will consider the information presented in this document and will be responsible for determining the action to be taken in this proposal by choosing an alternative. The Regional Director will determine whether the selected alternative is a major Federal action that will significantly affect the quality of the human environment within the meaning of Section 102(2)(c) of the National Environmental Policy Act of 1969. If it is determined not to be a major Federal action, a Finding of No Significant Impact will be issued. A Decision of Significant Impact will indicate the need to conduct more detailed environmental analysis in an Environmental Impact Statement.

1.4 Background

The mid-continent population of light geese (MCP), which includes the lesser snow goose (*Chen caerulescens*) and Ross' goose (*Chen rossii*), has been increasing at an estimated average rate of 5%/year (Abraham et al., 1996). Similarly, the winter index of the MCP has increased from 777,000 in 1970 to 2,400,000 in 2000 (Sharp and Moser, 2000). Currently the North American Waterfowl Management Plan population goal and the joint Central and Mississippi Flyway Council upper management thresholds have been exceeded (U.S. Fish and Wildlife Service, 2004). This annual rate of increase has resulted in extensive damage to the arctic breeding grounds due to over-grazing/grubbing by geese, which has a direct impact on the MCP as well as other bird species that utilize these breeding grounds. The many problems associated with this "over-grazing" are well documented by Batt et al. (1997) and U.S. Fish and Wildlife Service (2004). The U.S

Fish and Wildlife Service, together with the Canadian Wildlife Service, Ducks Unlimited and state wildlife officials are working together to address this problem with the formation of the Arctic Goose Habitat Working Group who's purpose is to provide recommendations for a solution. Although many methods were recommended by the group to achieve the goal of population reduction, sport hunting was the preferred method. Hunting was selected because harvest by hunters is an acceptable utilization of this resource and hunters are considered "a highly motivated, well equipped and economical labor force ... with a widely demonstrated commitment to waterfowl conservation" (Batt et al., 1997). The use of hunting as a tool to control the MCP was also supported by a majority of the participants in the MCP workshops held throughout the central and Mississippi flyways (Arnold, 1997).

In an effort to increase harvest of the MCP the U.S. Fish and Wildlife Service implemented a light goose conservation order (64 FR 7517 and Arctic Tundra Habitat Emergency Conservation Act, 1999) that permits the hunting of light geese, with fewer restrictions, during a new spring season. This extra harvest beyond the traditional fall/winter hunting season is expected to help reduce population growth of the MCP to sustainable levels.

The recommended harvest level needed to decrease the MCP 50% by 2005 was 1,410,000 geese/year (Rockwell and Ankey, 2000). During the 1999/2000 hunting season approximately 1,488,633 geese were harvested from the MCP, slightly exceeding the recommended harvest level (U.S. Fish and Wildlife Service, 2004). Any harvest beyond the recommended level will likely reduce the amount of time needed to reach populations goals.

2. Alternatives, Including the Proposed Action

Alternatives were developed that are consistent with a combination of Service needs including control of the expanding mid-continent population of light geese, public recreational use of the refuge, protection of visitor safety, and minimizing the impact to other wildlife species, including Federal threatened and endangered species, utilizing the refuge. A "No Action" alternative was also listed to highlight the potential consequences of no action being taken. All alternatives were formulated by U.S. Fish and Wildlife Service staff.

2.1 Alternatives not Considered for Detailed Analysis

Opening the entire refuge to light goose hunting was considered as a possible alternative. Although this may increase the light goose harvest on the refuge, it would negatively impact a majority of the wildlife species using the refuge, including threatened and endangered species; refuge habitat; and public use. This alternative was not evaluated in detail as a majority of the affects would be catastrophically negative and inconsistent with the Refuge's purpose.

2.2 Alternatives Carried Forward for Detailed Analysis

2.2.1 Alternative A (Proposed Action): Open a Portion of the Refuge to Guided Hunting During the Spring Light Goose Conservation Order Hunting Season.

Under this alternative a guided hunt will be implemented during the spring light goose conservation order which typically takes place from January 25th through April 30th. This hunt will focus on maximizing the harvest of light geese, specifically Lesser Snow Geese, by allowing guided hunting on a 235 acre portion of the Refuge (Figure 1). The rationale for selecting this portion of the refuge is based on several factors including 1) Preventing disturbance to nesting bald eagles; 2) Preventing hunt participants from disturbing the large numbers of ducks, geese and other wildlife specifically using the Refuge wetlands; 3) To prevent conflict with other compatible uses, especially wildlife viewing; and 4) This is one of the few larger agricultural sites on the Refuge that will not be converted to native prairie as stated in the Refuge Comprehensive Conservation Plan. A single guide will be selected, through a bidding and application process, each year. The selected guide will be responsible for taking hunters on the refuge to hunt in accordance with refuge specific regulations as mentioned in the Refuge Light Goose Hunting Plan (Appendix 1); and state and federal hunting regulations.

The bald eagle is the only federal threatened or endangered species that actively utilizes the refuge during the time period coinciding with the spring light goose conservation order hunting season. To mitigate any possible disturbance to bald eagles, the hunt boundaries were constructed at least one-quarter of a mile from known perching and roosting sites and one and one-half miles from the nesting site to avoid disturbing bald eagles. The daily duration of the proposed hunting activity is also limited to one-half day to decrease potential disturbance to bald eagles. These mitigation factors should preclude bald eagles from being negatively impacted by the proposed hunting activity.

2.2.2 Alternative B (No Action): Do not Implement a Light Goose Hunting Plan

Under this alternative a refuge light goose hunting plan will not be implemented and no light goose hunting will take place on the refuge.

2.2.3 Alternative C: Open a Portion of the Refuge to Unlimited Public Hunting During the Spring Light Goose Conservation Order Hunting Season.

Under this alternative unlimited public hunting will take place on the refuge during the spring light goose conservation order which typically takes place

from January 25th through April 30th. This hunt will focus on maximizing the harvest of light geese, specifically lesser snow geese, by allowing unlimited public hunting on a 235 acre portion of the Refuge (Figure 1). The rationale for selecting this portion of the refuge is based on several factors including 1) Preventing disturbance to nesting bald eagles; 2) Preventing hunt participants from disturbing the large numbers of ducks, geese and other wildlife specifically using the Refuge wetlands; 3) To prevent conflict with other compatible uses, especially wildlife viewing; and 4) This is one of the few larger agricultural sites on the Refuge that will not be converted to native prairie as stated in the Refuge Comprehensive Conservation Plan. An unlimited number of hunters will be allowed to hunt light geese on the hunt site in accordance with refuge specific regulations; and state and federal hunting regulations. The bald eagle is the only federal threatened or endangered species that actively utilizes the refuge during the time period coinciding with the spring light goose conservation order hunting season. To mitigate any possible disturbance to bald eagles, the hunt boundaries were constructed at least one-quarter of a mile from known perching and roosting sites and one and one-half miles from the nesting site to avoid disturbing bald eagles. The daily duration of the proposed hunting activity is also limited to one-half day to decrease potential disturbance to bald eagles. These mitigation factors should preclude bald eagles from being negatively impacted by the proposed hunting activity.

2.2.4 Alternative D: Open a Portion of the Refuge to Limited Public Hunting During the Spring Light Goose Conservation Order Hunting Season.

Under this alternative limited public hunting will take place on the refuge during the spring light goose conservation order which typically takes place from January 25th through April 30th. This hunt will focus on maximizing the harvest of light geese, specifically lesser snow geese, by allowing limited public hunting on a 235 acre portion of the Refuge (Figure 1). The rationale for selecting this portion of the refuge is based on several factors including 1) Preventing disturbance to nesting bald eagles; 2) Preventing hunt participants from disturbing the large numbers of ducks, geese and other wildlife specifically using the Refuge wetlands; 3) To prevent conflict with other compatible uses, especially wildlife viewing; and 4) This is one of the few larger agricultural sites on the Refuge that will not be converted to native prairie as stated in the Refuge Comprehensive Conservation Plan. The hunt will be conducted by refuge staff and will be limited to one group of not more than 10 hunters per day who will be selected through a daily, random, drawing process. Each hunting group must hunt in accordance with refuge specific regulations; and state and federal hunting regulations.

The bald eagle is the only federal threatened or endangered species that actively utilizes the refuge during the time period coinciding with the spring light goose conservation order hunting season. To mitigate any possible

disturbance to bald eagles, the hunt boundaries were constructed at least one-quarter of a mile from known perching and roosting sites and one and one-half miles from the nesting site to avoid disturbing bald eagles. The daily duration of the proposed hunting activity is also limited to one-half day to decrease potential disturbance to bald eagles. These mitigation factors should preclude Bald eagles from being negatively impacted by the proposed hunting activity.

2.3 Summary of Alternative Actions

Table 1. Summary of alternative actions.

Alternative A (Proposed Alternative)	Alternative B (No Action)	Alternative C	Alternative D
Under this alternative a guided hunt will be implemented on a 235 acre portion of the Refuge during the spring light goose conservation order. A single guide will be selected, through a bidding and application process, each year. The selected guide will be responsible for taking hunters on the refuge to hunt.	Under this alternative a refuge light goose hunting plan will not be implemented and no light goose hunting will take place on the refuge.	Under this alternative limited public hunting will take place on a 235 acre portion of the Refuge during the spring light goose conservation order. An unlimited number of hunters will be allowed to hunt light geese on the hunt site.	Under this alternative limited public hunting will take place on a 235 acre portion of the Refuge during the spring light goose conservation order. The hunt will be conducted by refuge staff and will be limited to one group of not more than 10 hunters per day who will be selected through a daily, random, drawing process.

3. Affected Environment

Squaw Creek National Wildlife Refuge was established under the authorities of the Migratory Bird Conservation Act of 1929 and the Migratory Bird Hunting Act of 1934. Signed into existence by President Franklin D. Roosevelt as the “Squaw Creek Migratory waterfowl Refuge” on August 23, 1935, in Executive Order 7156, the Refuge’s purpose was to “...effectuate further the purpose of the Migratory Bird Conservation Act.” The Executive Order further stated that the lands are to be used “as a refuge and breeding ground for migratory birds and other wildlife.”

3.1 Physical Characteristics

Squaw Creek National Wildlife Refuge is located in Holt County in northwestern Missouri, approximately half way between Kansas City, Missouri and Omaha, Nebraska, 2.5 miles west of Interstate Highway 29. The Refuge gets its name from Squaw Creek, a major stream that drains the Loess Hills on the east and flows through the Missouri River floodplain portion of the refuge via a man-made ditch, and then empties into the Missouri River approximately 8 miles south of the refuge. Davis Creek, which has also been ditched, flows along the eastern refuge boundary and joins Squaw Creek just after leaving the refuge. The Refuge's west boundary is about 5 miles from the closest bank of the Missouri River. The Santa Fe-Burlington Northern railroad grade runs along the west boundary of the Refuge.

3.2 Biological Environment

3.2.1 Habitat/Vegetation

The refuge contains 7,441 acres of wetlands; wet and mesic prairie; bottomland and upland forest; and agricultural cropland. It lies in the floodplain of the Missouri River and extends into the Loess Hill region of northwestern Missouri.

The floodplain habitat includes approximately 6,700 acres of managed wetlands, grasslands, riparian habitats, and agricultural fields; including Missouri's largest wet prairie remnant (938 acres) which is located in the center of the Refuge. Refuge lowlands were once part of a large natural marsh in the Missouri River floodplain.

The approximately 740 acres of Refuge uplands include a segment of the 200-mile long band of bluffs known as the Loess Hills. The Loess Hills support rare remnants of native prairie and prairie associated wildlife along with oak-hickory dominated deciduous forest.

3.2.2 Listed, Proposed, and Candidate Species

Three Federal threatened/endangered species and one Federal candidate species use the refuge. These include the bald eagle (*Haliaeetus leucocephalus*), piping plover (*Charadrius melodus*), least tern (*Sterna antillarum*), and eastern massasauga rattlesnake (*Sistrurus catenatus*).

The piping plover and least tern are occasional visitors of the refuge with approximately 2-3 sightings per/year. They typically do not occur on the refuge during the spring light goose conservation order hunting season and they do not use the agricultural cropland on the refuge. Encounters between these species and hunt participants are highly unlikely. These temporal and spatial differences, relative to the location and timing of the proposed

hunting activity, preclude them from being negatively impacted by such activity. An Intra-Service Section 7 Biological Evaluation resulted in a “No Effect” determination for both species (Appendix 2).

Eastern Massasauga Rattlesnakes do not use the agricultural cropland on the refuge and are hibernating during a significant portion of the spring light goose conservation order hunting season. Encounters between this species and hunt participants is highly unlikely. These temporal and spatial differences, relative to the location and timing of the proposed hunting activity, preclude them from being negatively impacted by such activity. An Intra-Service Section 7 Biological Evaluation resulted in a “No Effect” determination for this species (Appendix 2).

The bald eagle is the only federal threatened or endangered species that actively utilizes the refuge during the time period coinciding with the spring light goose conservation order hunting season. This species, which is migrating during the same time period as light geese and other waterfowl, are abundant on the refuge during this time period. Up to 144 bald eagles have been recorded on the refuge during the spring migration and breeding period. One pair of bald eagles has continually nested and fledged several young on the refuge over the past 8 years.

To mitigate any possible disturbance to bald eagles, the hunt boundaries were constructed at least one-quarter of a mile from known perching and roosting sites and one and one-half miles from the nesting site to avoid disturbing bald eagles. The daily duration of the proposed hunting activity is also limited to one-half day to decrease potential disturbance to bald eagles. These mitigation factors should preclude bald eagles from being negatively impacted by the proposed hunting activity. An Intra-Service Section 7 Biological Evaluation resulted in a “May Effect But Not Likely To Adversely Effect Species/Critical Habitat” determination for bald eagles (Appendix 2).

3.2.3 Other Wildlife Species

The Refuge hosts 310 species of birds, 33 mammals, and 35 reptiles and amphibians. Other species of wildlife that commonly utilize the agricultural cropland in the proposed hunt area include white-tailed deer (*Odocoileus virginianus*) and wild turkeys (*Meleagris gallopavo*).

3.3 Land Use

The proposed hunting area (Figure 1) is currently in agricultural production which includes a 2-year rotation of corn and soybeans. All farming of this site is accomplished through the Refuge’s cooperative farming program.

The land uses immediately adjacent to the proposed hunting area (Figure 1) include Refuge native prairie, other Refuge agricultural lands; and private agricultural lands.

3.4 Cultural/Paleontological Resources

No known archaeological or cultural resources are located on the hunt area, which has been in agricultural production for over 20 years. Additionally, conduct of the hunt will not involve any significant soil disturbance.

3.5 Local Socio-economic Conditions

Based upon 2000 census data (or as indicated), Holt County can be characterized by the following statistics:

- Population 5,268 (2001 data)
- 99.1 percent are Caucasian with a balance of other races
- Median age is 41.8
- 26.2 percent are 19 years old or younger
- 24.2 percent are 62 years old or older
- 81.9 percent of persons over 25 years old are high school graduates
- 11.7 percent of persons over 25 years old have a bachelors degree or higher
- Farmland (1997) 231,040 acres (78 percent of county area)
- Personal income per capita \$15,876
- Median household income \$29,461

Locally, the economy is based primarily on agriculture with some small business, light industry, government and recreation. In Holt County 78% of the land is in agricultural production. The major agricultural crops include corn and soybeans. The recreational portion of the economy is based heavily on hunting, fishing, wildlife viewing and other recreational opportunities, many of which are directly or indirectly dependant on the Refuge.

4. Environmental Consequences

4.1. Alternative A (Proposed Action)

4.1.1 Habitat Impacts

This alternative will have no impact on Refuge habitat.

This alternative may result in additional MCP light geese being harvested during the Spring Light Goose Conservation Order Hunting Season. Although the expected harvest on the refuge is unknown, any additional harvest of MCP light geese may have a positive affect on the arctic breeding ground habitat and the associated wildlife species.

4.1.2 Biological Impacts

White-tailed deer typically inhabit this area at night, while they are feeding on waste grain, and should not be impacted by the proposed hunting activity.

Wild turkeys commonly utilize this area during the day but should not be impacted by the proposed hunting activity as they will have access to these fields in the afternoon, after 1:00 PM. Additionally, as there are several hundred acres of agricultural fields on the refuge that they can alternatively utilize and several thousand acres of agricultural fields immediately adjacent to the Refuge that they may also utilize.

The goal of this hunt is to remove as many MCP light geese from the population as possible under the existing rules of the hunt. Therefore this alternative may result in a negative, short term, impact on MCP of light geese but a long term positive benefit through the overall reduction of the population.

4.1.3 Listed, Proposed, and Candidate Species

The bald eagle is the only federal threatened or endangered species that actively utilizes the refuge during the time period coinciding with the spring light goose conservation order hunting season. Non-toxic shot only will be used, as per federal regulations, so there will be no chance of secondary lead poisoning. To mitigate any possible disturbance to bald eagles, the hunt boundaries were constructed at least one-quarter of a mile from known perching and roosting sites and one and one-half miles from the nesting site to avoid disturbing bald eagles. The daily duration of the proposed hunting activity is also limited to one-half day to decrease potential disturbance to bald eagles. These mitigation factors should preclude bald eagles from being negatively impacted by the proposed hunting activity.

4.1.4 Cultural Resources

The proposed hunting activity will have no negative impact on known archaeological and cultural resources.

4.1.5 Environmental Justice

The proposed hunting activity will have no impact on minority populations.

Low income populations, who can not afford to pay for a guided hunt, may be adversely affected by this action. This is mitigated by the presence of other public lands, including 7,115 acres of state managed lands, within a 15 mile radius of the Refuge, that allow snow goose hunting during the Spring Light Goose Conservation Order Hunting Season without any related access fees. This land base includes Bob Brown Conservation Area (3,302 acres) located approximately 5 miles southwest of the Refuge and Nodaway Valley Conservation Area (3,813 acres) located approximately 10 miles east of the Refuge.

Under this alternative the selected guide may gain financial benefits. The selected guide will be responsible for determining all guide related fees.

4.1.6 Public Health and Safety

Under this alternative there are no known negative impacts on human health and safety.

4.1.7 Cumulative Impacts

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

Resident Wildlife

Direct or indirect impact to resident wildlife such as white-tailed deer and wild turkey will be minimal or non-existent. The use of the proposed hunt site by these species is negligible as very little waste grain remains on the proposed hunt site during the Spring Light Goose Conservation Order Hunting Season.

Migratory Species

The proposed hunt may have a direct impact on MCP light geese which is desired effect. The mid-continent population of light geese (MCP), which includes the lesser snow goose (*Chen caerulescens*) and Ross' goose (*Chen rossi*), has been increasing at an estimated average rate of 5%/year (Abraham et al., 1996). Similarly, the winter index of the MCP has increased from 777,000 in 1970 to 2,400,000 in 2000 (Sharp and Moser, 2000). Currently the North American Waterfowl Management Plan population goal and the joint Central and Mississippi Flyway Council upper management thresholds have been exceeded (U.S. Fish and Wildlife Service, 2004). This annual rate of increase has resulted in extensive damage to the arctic breeding grounds due to over-grazing/grubbing by geese, which has a direct impact on the MCP as well as other bird species that utilize these breeding grounds. The many problems associated with this "over-grazing" are well documented by Batt et al. (1997) and U.S. Fish and Wildlife Service (2004). The U.S Fish and Wildlife Service, together with the Canadian Wildlife Service, Ducks Unlimited and state wildlife officials are working together to address this problem with the formation of the Arctic Goose Habitat Working Group whose purpose is to provide recommendations for a solution. Although many methods were recommended by the group to achieve the goal of population reduction, sport hunting was the preferred method. Hunting was selected because harvest by hunters is an acceptable utilization of this resource and hunters are considered "a highly motivated, well equipped and economical labor force ... with a widely demonstrated commitment to waterfowl conservation" (Batt et al., 1997). The use of

hunting as a tool to control the MCP was also supported by a majority of the participants in the MCP workshops held throughout the central and Mississippi flyways (Arnold, 1997).

In an effort to increase harvest of the MCP the U.S. Fish and Wildlife Service implemented a light goose conservation order (64 FR 7517 and Arctic Tundra Habitat Emergency Conservation Act, 1999) that permits the hunting of light geese, with fewer restrictions, during a new spring season. This extra harvest beyond the traditional fall/winter hunting season is expected to help reduce population growth of the MCP to sustainable levels.

The recommended harvest level needed to decrease the MCP 50% by 2005 was 1,410,000 geese/year (Rockwell and Ankey, 2000). During the 1999/2000 hunting season approximately 1,488,633 geese were harvested from the MCP, slightly exceeding the recommended harvest level (U.S. Fish and Wildlife Service, 2004). The additional harvest attributed to this alternative may decrease the time necessary to reduce the MCP to population levels that the arctic breeding ground habitat can support which may, in turn, prevent additional damage to this habitat.

Small numbers of non-target migratory species including Canada geese (*Branta canadensis*), white-fronted geese (*Anser albifrons*), mallard (*Anas platyrhynchos*) and Northern pintail (*Anas acuta*) may be found within flocks of MCP light geese, however there is no open hunting season for these species during the Spring Light Goose Conservation Order Hunting Season, resulting in no direct impact to these species. Disturbance from hunting on the proposed hunt site may indirectly impact these non-target species by excluding them from feeding on the waste grain located on the site, however this disturbance will be limited due to the minimal number that use the site and/or typically occur within MPC light goose flocks, resulting in minimal or no indirect impact on non-target species. Additionally, any waste grain remaining on the proposed hunt site will be available to these species in the afternoon, after 1:00 PM when the hunt closes.

Endangered Species

Three Federal threatened/endangered species and one Federal candidate species use the refuge. These include the bald eagle (*Haliaeetus leucocephalus*), piping plover (*Charadrius melodus*), least tern (*Sterna antillarum*), and Eastern massasauga rattlesnake (*Sistrurus catenatus*).

The piping plover and least tern are occasional visitors of the refuge with approximately 2-3 sightings per/year. They typically do not occur on the refuge during the Spring Light Goose Conservation Order Hunting Season and they do not use the agricultural cropland on the refuge. Encounters

between these species and hunt participants is highly unlikely. These temporal and spatial differences, relative to the location and timing of the proposed hunting activity, preclude them from being negatively impacted by such activity. An Intra-Service Section 7 Biological Evaluation resulted in a “No Effect” determination for both species (Appendix 2).

Eastern massasauga rattlesnakes do not use the agricultural cropland on the refuge and are hibernating during a significant portion of the Spring Light Goose Conservation order hunting season. Encounters between this species and hunt participants is highly unlikely. These temporal and spatial differences, relative to the location and timing of the proposed hunting activity, preclude them from being negatively impacted by such activity. An Intra-Service Section 7 Biological Evaluation resulted in a “No Effect” determination for this species (Appendix 2).

The bald eagle is the only Federal threatened or endangered species that actively utilizes the refuge during the time period coinciding with the Spring Light Goose Conservation Order Hunting Season. This species, which is migrating during the same time period as light geese and other waterfowl, are abundant on the refuge during this time period. Up to 144 bald eagles have been recorded on the refuge during the spring migration and breeding period. One pair of bald eagles has continually nested and fledged several young on the refuge over the past 8 years.

To mitigate any possible disturbance to bald eagles, the hunt boundaries were constructed at least one-quarter of a mile from known perching and roosting sites and one and one-half miles from the nesting site to avoid disturbing bald eagles. The daily duration of the proposed hunting activity is also limited to one-half day to decrease potential disturbance to bald eagles. These mitigation factors should preclude bald eagles from being negatively impacted by the proposed hunting activity. An Intra-Service Section 7 Biological Evaluation resulted in a “May Effect But Not Likely To Adversely Effect Species/Critical Habitat” determination for bald eagles (Appendix 2).

B. Anticipated Direct and Indirect Impacts of Proposed Action on refuge Programs, Facilities, and Cultural Resources.

Refuge Facilities and User Conflicts

Approximately 30,000 visitors use the refuge to view migrating light geese and other birds during this time period. Hunters pursuing light geese are also using the adjacent private lands during this time period. Direct conflict between refuge hunt participants and visitors and off-refuge hunters will be reduced by limiting guide and hunter access to the State Highway 118 entrance, a non-public access entrance, by not permitting hunting within $\frac{1}{4}$ mile of the auto tour loop road (Figure 1), and not permitting hunters to retrieve crippled geese outside of the hunt boundary. These measures should result in little or no direct or indirect impact to other refuge wildlife-

dependant recreational programs such as wildlife observation, wildlife photography, wildlife interpretation, environmental education or fishing.

The use of the State Highway 118 access road to the refuge by hunt participants may result in extra wear to this road. To mitigate this potential damage to refuge facilities the refuge will gravel this portion of the access road. No other refuge facilities will be directly or indirectly impacted by the proposed hunting activity.

Cultural Resources

The proposed hunting activity will take place in an agricultural field that has been in agricultural production for approximately 20 years and will have no direct or indirect impact on known archaeological and cultural resources.

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

Refuge Natural Environment

The proposed hunting activity will take place in an agricultural field that has been in agricultural production for approximately 20 years and will have no direct or indirect impact on the refuge's water, air or soil quality and the refuge's ability to restore and manage habitat.

Impact on Adjacent Lands and Nearby Residents

The refuge does not contain any private in-holdings and participants in the proposed hunting activity will only be allowed to access the hunting site. Additionally, boundary signs mark both the refuge boundary and the hunt Site which should prevent trespassing on adjacent private lands. These measures should result in no impact to adjacent public and private lands.

The private land east of the hunting site is in agricultural production and the nearest residence is approximately one half mile north of the hunting site, resulting in minimal or no impact to nearby residents. Several portions of this agricultural land may be hunted during the spring light goose conservation order hunting season however the addition of a refuge hunt should have minor impacts on other hunters and in some cases may increase the success of these hunters by moving geese from the proposed hunt site.

Economic Impacts

Wildlife related recreation, including hunting, is an important part of the local economy and the tourism dollars, including the revenue to the guide

service, generated by the proposed hunting activity may have some limited, positive impact on the area. Refuge staff will be required to spend some additional time for managing the hunt and gravel will be purchased for the access road, but there will be no negative economic impact to the refuge.

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

The only other hunting that currently takes place on the refuge is the annual muzzleloader white-tailed deer hunt which was initiated in 1988 to help reduce deer numbers and damage to refuge habitats. This hunt typically takes place during the first weekend of January, each year, and is limited to the northern half of the refuge. Although the deer hunt boundary includes all of the proposed light goose hunt boundary, this hunt will have no impact on the proposed light goose hunt which begins approximately two months after the deer hunt ends or the MCP of light geese.

The Service has no plans to open any additional hunts on Squaw Creek NWR in the foreseeable future.

E. Anticipated Impacts if Individual Hunts are Allowed to Accumulate

The proposed hunting activity may impact the MCP of light geese at the local, regional and flyway level. However this impact, the reduction of the MCP of light geese, is the desired effect. Based on the spatial and temporal scale of the proposed hunting activity and the existing white-tailed deer hunt there will be no cumulative impact to refuge programs or the refuge environment.

4.1.8 Public Use

Guided hunting will result in a quality hunting experience for hunt participants and decrease potential hunter safety issues.

There is limited potential for conflict with other recreational uses, especially wildlife viewing, during the hunt period. The use of a designated hunting area away from the auto tour route and a hunter parking area away from other public use areas will mitigate any potential impact.

Hunting pressure may impact the number and duration of stay for light geese using the Refuge. This may, in turn, affect wildlife viewing opportunities. The reaction of light geese to this hunt will be closely monitored by refuge staff and appropriate measures, including closing the hunt, will be implemented if necessary to mitigate any impact.

4.1.9 Socioeconomics

This alternative will reduce the need for additional refuge staff time for managing the hunt and will meet the current refuge staffing plan and budget.

This alternative may have a positive impact on the local community by increasing the amount of local goods and services purchased by hunters participating in the proposed hunting activity.

4.1.10 Public Perception

Recreational hunting is widely accepted in the local area. Limited conflict is expected from the non-consumptive recreational public that utilizes the refuge. Complaints will serve as an opportunity to educate the public about the light goose problem and the use of hunting as a wildlife management tool.

Other limited public conflict may include complaints from owners/users of local duck clubs neighboring the Refuge and local hunters who may be concerned with the potential effects of the refuge light goose hunting program on their own hunting properties or opportunities. Complaints will serve as opportunities to educate the public about hunting as a compatible use of the refuge and as a wildlife management tool.

4.2. Alternative B (No Action)

4.2.1 Habitat Impacts

This alternative will have no impact on Refuge habitat.

This alternative may result in a slower recovery time for the arctic breeding ground habitat.

4.2.2 Biological Impacts

This alternative will have no biological impact on the Refuge.

This alternative will not result in the additional harvest of the MCP of light geese.

4.2.3 Listed, Proposed, and Candidate Species

This alternative will have no impact on listed, proposed and candidate species.

4.2.4 Cultural Resources

This alternative will have no impact on archaeological and cultural resources.

4.2.5 Environmental Justice

This alternative will have no impact minority and low income populations.

4.2.6 Public Health and Safety

Under this alternative there are no known negative impacts on human health and safety.

4.2.7 Cumulative Impacts

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

Resident Wildlife

This alternative may reduce the waste grain available to other resident wildlife, such as white-tailed deer and wild turkey, by allowing light geese to feed undisturbed on the proposed hunt site. However, due to the small size and limited amount of waste grain produced on the site this indirect impact will be minimal.

Migratory Species

This alternative may adversely impact the MCP of light geese and other migratory bird species that share the MCP light goose arctic breeding grounds. By not facilitating the reduction of the MCP of light geese, their continuing negative impact on the arctic breeding ground habitat will be perpetuated.

Endangered Species

This alternative will have no direct or indirect impact on the three Federal threatened/endangered species and one Federal candidate species using the refuge. These include the bald eagle (*Haliaeetus leucocephalus*), piping plover (*Charadrius melodus*), least tern (*Sterna antillarum*), and eastern massasauga rattlesnake (*Sistrurus catenatus*).

B. Anticipated Direct and Indirect Impacts of Proposed Action on refuge Programs, Facilities, and Cultural Resources.

Refuge Facilities and User Conflicts

This alternative will have no direct or indirect impact on refuge facilities and other refuge wildlife-dependant recreational programs such as wildlife observation, wildlife photography, wildlife interpretation, environmental education or fishing.

Cultural Resources

This alternative will have no direct or indirect impact on known archaeological and cultural resources.

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

Refuge Natural Environment

This alternative will have no direct or indirect impact on the refuge's water, air or soil quality and the refuge's ability to restore and manage habitat.

Impact on Adjacent Lands and Nearby Residents

This alternative will have no direct or indirect impact on adjacent public and private lands or nearby residents.

Economic Impacts

This alternative may have a limited direct or indirect economic impact on the local economy by reducing the revenue that would otherwise be generated from the hunt participants and guide service. This alternative will have no direct or indirect economic impact on the refuge.

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

This alternative will have no direct or indirect impact on the refuge annual muzzleloader white-tailed deer hunt.

E. Anticipated Impacts if Individual Hunts are Allowed to Accumulate

This alternative may cumulatively impact the MCP of light geese and other migratory bird species that share the MCP light goose arctic breeding grounds.

By not facilitating the reduction of the MCP of light geese, their continuing negative impact on the arctic breeding ground habitat will be perpetuated.

4.2.8 Public Use

This alternative will have no impact on existing public uses of the refuge. However this alternative will not result in any new public use opportunities on the Refuge.

4.2.9 Socioeconomics

This alternative will have no impact on the refuge budget or local socioeconomics.

4.2.10 Public Perception

This alternative may negatively impact public perception of the refuge by those who question why we are not having a light goose hunt on the refuge in order to do our part to address the light goose problem.

4.3. Alternative C

4.3.1 Habitat Impacts

This alternative will have no impact on Refuge habitat.

This alternative may result in additional MCP light geese being harvested during the Spring Light Goose Conservation Order Hunting Season. Although the expected harvest on the refuge is unknown, any additional harvest of MCP light geese may have a positive affect on the arctic breeding ground habitat and the associated wildlife species.

4.3.2 Biological Impacts

White-tailed deer typically inhabit this area at night, while they are feeding on waste grain, and should not be impacted by the proposed hunting activity. Wild turkeys commonly utilize this area during the day but should not be impacted by the proposed hunting activity as they will have access to these fields in the afternoon, after 1:00 PM. Additionally, as there are several hundred acres of agricultural fields on the refuge that they can alternatively utilize and several thousand acres of agricultural fields immediately adjacent to the Refuge that they may also utilize.

The goal of this hunt is to remove as many MCP light geese from the population as possible under the existing rules of the hunt. Therefore this alternative may result in a negative, short term, impact on MCP of light

geese but a long term positive benefit through the overall reduction of the population.

4.3.3 Listed, Proposed, and Candidate Species

The bald eagle is the only federal threatened or endangered species that actively utilizes the refuge during the time period coinciding with the spring light goose conservation order hunting season. Non-toxic shot only will be used, as per federal regulations, so there will be no chance of secondary lead poisoning. To mitigate any possible disturbance to bald eagles, the hunt boundaries were constructed at least one-quarter of a mile from known perching and roosting sites and one and one-half miles from the nesting site to avoid disturbing bald eagles. The daily duration of the proposed hunting activity is also limited to one-half day to decrease potential disturbance to bald eagles. These mitigation factors should preclude bald eagles from being negatively impacted by the proposed hunting activity.

4.3.4 Cultural Resources

The proposed hunting activity will have no negative impact on known archaeological and cultural resources.

4.3.5 Environmental Justice

This alternative will have no impact minority and low income populations.

4.3.6 Public Health and Safety

Under this alternative there are no known negative impacts on human health and safety.

4.3.7 Cumulative Impacts

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

Resident Wildlife

Direct or indirect impact to resident wildlife such as white-tailed deer and wild turkey will be minimal or non-existent. The use of the proposed hunt site by these species is negligible as very little waste grain remains on the proposed hunt site during the Spring Light Goose Conservation Order Hunting Season.

Migratory Species

The proposed hunt may have a direct impact on MCP light geese which is

desired effect. The mid-continent population of light geese (MCP), which includes the lesser snow goose (*Chen caerulescens*) and Ross' goose (*Chen rossii*), has been increasing at an estimated average rate of 5%/year (Abraham et al., 1996). Similarly, the winter index of the MCP has increased from 777,000 in 1970 to 2,400,000 in 2000 (Sharp and Moser, 2000). Currently the North American Waterfowl Management Plan population goal and the joint Central and Mississippi Flyway Council upper management thresholds have been exceeded (U.S. Fish and Wildlife Service, 2004). This annual rate of increase has resulted in extensive damage to the arctic breeding grounds due to over-grazing/grubbing by geese, which has a direct impact on the MCP as well as other bird species that utilize these breeding grounds. The many problems associated with this "over-grazing" are well documented by Batt et al. (1997) and U.S. Fish and Wildlife Service (2004). The U.S. Fish and Wildlife Service, together with the Canadian Wildlife Service, Ducks Unlimited and state wildlife officials are working together to address this problem with the formation of the Arctic Goose Habitat Working Group whose purpose is to provide recommendations for a solution. Although many methods were recommended by the group to achieve the goal of population reduction, sport hunting was the preferred method. Hunting was selected because harvest by hunters is an acceptable utilization of this resource and hunters are considered "a highly motivated, well equipped and economical labor force ... with a widely demonstrated commitment to waterfowl conservation" (Batt et al., 1997). The use of hunting as a tool to control the MCP was also supported by a majority of the participants in the MCP workshops held throughout the central and Mississippi flyways (Arnold, 1997).

In an effort to increase harvest of the MCP the U.S. Fish and Wildlife Service implemented a light goose conservation order (64 FR 7517 and Arctic Tundra Habitat Emergency Conservation Act, 1999) that permits the hunting of light geese, with fewer restrictions, during a new spring season. This extra harvest beyond the traditional fall/winter hunting season is expected to help reduce population growth of the MCP to sustainable levels.

The recommended harvest level needed to decrease the MCP 50% by 2005 was 1,410,000 geese/year (Rockwell and Ankey, 2000). During the 1999/2000 hunting season approximately 1,488,633 geese were harvested from the MCP, slightly exceeding the recommended harvest level (U.S. Fish and Wildlife Service, 2004). The additional harvest attributed to this alternative may decrease the time necessary to reduce the MCP to population levels that the arctic breeding ground habitat can support which may, in turn, prevent additional damage to this habitat.

Small numbers of non-target migratory species including Canada geese (*Branta canadensis*), white-fronted geese (*Anser albifrons*), mallard (*Anas platyrhynchos*) and Northern pintail (*Anas acuta*) may be found within flocks of MCP light geese, however there is no open hunting season for these species

during the Spring Light Goose Conservation Order Hunting Season, resulting in no direct impact to these species.

Disturbance from hunting on the proposed hunt site may indirectly impact these non-target species by excluding them from feeding on the waste grain located on the site, however this disturbance will be limited due to the minimal number that use the site and/or typically occur within MPC light goose flocks, resulting in minimal or no indirect impact on non-target species. Additionally, any waste grain remaining on the proposed hunt site will be available to these species in the afternoon, after 1:00 PM when the hunt closes.

Endangered Species

Three Federal threatened/endangered species and one Federal candidate species use the refuge. These include the bald eagle (*Haliaeetus leucocephalus*), piping plover (*Charadrius melodus*), least tern (*Sterna antillarum*), and Eastern massasauga rattlesnake (*Sistrurus catenatus*).

The piping plover and least tern are occasional visitors of the refuge with approximately 2-3 sightings per/year. They typically do not occur on the refuge during the Spring Light Goose Conservation Order Hunting Season and they do not use the agricultural cropland on the refuge. Encounters between these species and hunt participants are highly unlikely. These temporal and spatial differences, relative to the location and timing of the proposed hunting activity, preclude them from being negatively impacted by such activity. An Intra-Service Section 7 Biological Evaluation resulted in a “No Effect” determination for both species (Appendix 2).

Eastern massasauga rattlesnakes do not use the agricultural cropland on the refuge and are hibernating during a significant portion of the Spring Light Goose Conservation Order Hunting Season. Encounters between this species and hunt participants are highly unlikely. These temporal and spatial differences, relative to the location and timing of the proposed hunting activity, preclude them from being negatively impacted by such activity. An Intra-Service Section 7 Biological Evaluation resulted in a “No Effect” determination for this species (Appendix 2).

The bald eagle is the only Federal threatened or endangered species that actively utilizes the refuge during the time period coinciding with the Spring Light Goose Conservation Order Hunting Season. This species, which is migrating during the same time period as light geese and other waterfowl, are abundant on the refuge during this time period. Up to 144 bald eagles have been recorded on the refuge during the spring migration and breeding period. One pair of bald eagles has continually nested and fledged several young on the refuge over the past 8 years.

To mitigate any possible disturbance to bald eagles, the hunt boundaries were constructed at least one-quarter of a mile from known perching and roosting sites

and one and one-half miles from the nesting site to avoid disturbing bald eagles. The daily duration of the proposed hunting activity is also limited to one-half day to decrease potential disturbance to bald eagles. These mitigation factors should preclude bald eagles from being negatively impacted by the proposed hunting activity. An Intra-Service Section 7 Biological Evaluation resulted in a “May Effect But Not Likely To Adversely Effect Species/Critical Habitat” determination for bald eagles (Appendix 2).

B. Anticipated Direct and Indirect Impacts of Proposed Action on refuge Programs, Facilities, and Cultural Resources.

Refuge Facilities and User Conflicts

Approximately 30,000 visitors use the refuge to view migrating light geese and other birds during this time period. Hunters pursuing light geese are also using the adjacent private lands during this time period. Direct conflict between refuge hunt participants and visitors and off-refuge hunters will be reduced by limiting hunter access to the State Highway 118 entrance, a non-public access entrance, by not permitting hunting within ¼ mile of the auto tour loop road (Figure 1), and not permitting hunters to retrieve crippled geese outside of the hunt boundary. These measures should result in little or no direct or indirect impact to other refuge wildlife-dependant recreational programs such as wildlife observation, wildlife photography, wildlife interpretation, environmental education or fishing.

The use of the State Highway 118 access road to the refuge by hunt participants may result in extra wear to this road. To mitigate this potential damage to refuge facilities the refuge will gravel this portion of the access road. No other refuge facilities will be directly or indirectly impacted by the proposed hunting activity.

Cultural Resources

The proposed hunting activity will take place in an agricultural field that has been in agricultural production for approximately 20 years and will have no direct or indirect impact on known archaeological and cultural resources.

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

Refuge Natural Environment

The proposed hunting activity will take place in an agricultural field that has been in agricultural production for approximately 20 years and will have no direct or indirect impact on the refuge’s water, air or soil quality and the refuge’s ability to restore and manage habitat.

Impact on Adjacent Lands and Nearby Residents

The refuge does not contain any private in-holdings and participants in the proposed hunting activity will only be allowed to access the hunting site. Additionally, boundary signs mark both the refuge boundary and the hunt site which should prevent trespassing on adjacent private lands. These measures should result in no impact to adjacent public and private lands.

The private land east of the hunting site is in agricultural production and the nearest residence is approximately one half mile north of the hunting site, resulting in minimal or no impact to nearby residents. Several portions of this agricultural land may be hunted during the spring light goose conservation order hunting season however the addition of a refuge hunt should have minor impacts on other hunters and in some cases may increase the success of these hunters by moving geese from the proposed hunt site.

Economic Impacts

Wildlife related recreation, including hunting, is an important part of the local economy and the tourism dollars, including the revenue to the guide service, generated by the proposed hunting activity may have some limited, positive impact on the area. Refuge staff will be required to spend some additional time for managing the hunt and gravel will be purchased for the access road, but there will be no negative economic impact to the refuge.

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

The only other hunting that currently takes place on the refuge is the annual muzzleloader white-tailed deer hunt which was initiated in 1988 to help reduce deer numbers and damage to refuge habitats. This hunt typically takes place during the first weekend of January, each year, and is limited to the northern half of the refuge. Although the deer hunt boundary includes all of the proposed light goose hunt boundary, this hunt will have no impact on the proposed light goose hunt which begins approximately two months after the deer hunt ends or the MCP of light geese.

The Service has no plans to open any additional hunts on Squaw Creek NWR in the foreseeable future.

E. Anticipated Impacts if Individual Hunts are Allowed to Accumulate

The proposed hunting activity may impact the MCP of light geese at the local, regional and flyway level. However this impact, the reduction of the MCP of light geese, is the desired effect. Based on the spatial and temporal scale of the

proposed hunting activity and the existing white-tailed deer hunt there will be no cumulative impact to refuge programs or the refuge environment.

4.3.8 Public Use

Unlimited public hunting on the proposed light goose hunting area will greatly decrease hunt quality and increase potential hunter safety issues.

There is limited potential for conflict with other recreational uses, especially wildlife viewing, during the hunt period. The use of a designated hunting area away from the auto tour route and a hunter parking area away from other public use areas will mitigate any potential impact.

Hunting pressure may impact the number and duration of stay for light geese using the Refuge. This may, in turn, affect wildlife viewing opportunities. The reaction of light geese to this hunt will be closely monitored by refuge staff and appropriate measures, including closing the hunt, will be implemented if necessary to mitigate any impact.

4.3.9 Socioeconomics

This alternative will result in an increased need for refuge staff time in order to monitor the hunt and may result in fiscal and personnel needs that exceed the current refuge staffing plan and budget.

This alternative may have a positive impact on the local community by increasing the amount of local goods and services purchased by hunters participating in the proposed hunting activity.

4.3.10 Public Perception

Recreational hunting is widely accepted in the local area. Limited conflict is expected from the non-consumptive recreational public that utilizes the refuge. Complaints will serve as an opportunity to educate the public about the light goose problem and the use of hunting as a wildlife management tool.

Other limited public conflict may include complaints from owners/users of local duck clubs neighboring the Refuge and local hunters who may be concerned with the potential effects of the refuge light goose hunting program on their own hunting properties or opportunities. Complaints will serve as opportunities to educate the public about hunting as a compatible use of the refuge and as a wildlife management tool.

4.4 Alternative D

4.4.1 Habitat Impacts

This alternative will have no impact on Refuge habitat.

This alternative may result in additional MCP light geese being harvested during the Spring Light Goose Conservation Order Hunting Season. Although the expected harvest on the refuge is unknown, any additional harvest of MCP light geese may have a positive affect on the arctic breeding ground habitat and the associated wildlife species.

4.4.2 Biological Impacts

White-tailed deer typically inhabit this area at night, while they are feeding on waste grain, and should not be impacted by the proposed hunting activity. Wild turkeys commonly utilize this area during the day but should not be impacted by the proposed hunting activity as they will have access to these fields in the afternoon, after 1:00 PM. Additionally, as there are several hundred acres of agricultural fields on the refuge that they can alternatively utilize and several thousand acres of agricultural fields immediately adjacent to the Refuge that they may also utilize.

This alternative may result in a negative, short term, impact on MCP of light geese but a long term positive benefit through the overall reduction of the population.

4.4.3 Listed, Proposed, and Candidate Species

The bald eagle is the only federal threatened or endangered species that actively utilizes the refuge during the time period coinciding with the spring light goose conservation order hunting season. To mitigate any possible disturbance to bald eagles, the hunt boundaries were constructed at least one-quarter of a mile from known perching and roosting sites and one and one-half miles from the nesting site to avoid disturbing bald eagles. The daily duration of the proposed hunting activity is also limited to one-half day to decrease potential disturbance to bald eagles. Although this alternative could result in an increase in the number of hunters using the proposed hunting site these mitigation factors should preclude bald eagles from being negatively impacted by the proposed hunting activity.

4.4.4 Cultural Resources

The proposed hunting activity will have no negative impact on known archaeological and cultural resources.

4.4.5 Environmental Justice

This alternative will have no impact minority and low income populations.

4.4.6 Public Health and Safety

Under this alternative there are no known negative impacts on human health and safety.

4.4.7 Cumulative Impacts

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

Resident Wildlife

Direct or indirect impact to resident wildlife such as white-tailed deer and wild turkey will be minimal or non-existent. The use of the proposed hunt site by these species is negligible as very little waste grain remains on the proposed hunt site during the Spring Light Goose Conservation Order Hunting Season.

Migratory Species

The proposed hunt may have a direct impact on MCP light geese which is desired effect. The mid-continent population of light geese (MCP), which includes the lesser snow goose (*Chen caerulescens*) and Ross' goose (*Chen rossii*), has been increasing at an estimated average rate of 5%/year (Abraham et al., 1996). Similarly, the winter index of the MCP has increased from 777,000 in 1970 to 2,400,000 in 2000 (Sharp and Moser, 2000). Currently the North American Waterfowl Management Plan population goal and the joint Central and Mississippi Flyway Council upper management thresholds have been exceeded (U.S. Fish and Wildlife Service, 2004). This annual rate of increase has resulted in extensive damage to the arctic breeding grounds due to over-grazing/grubbing by geese, which has a direct impact on the MCP as well as other bird species that utilize these breeding grounds. The many problems associated with this "over-grazing" are well documented by Batt et al. (1997) and U.S. Fish and Wildlife Service (2004). The U.S. Fish and Wildlife Service, together with the Canadian Wildlife Service, Ducks Unlimited and state wildlife officials are working together to address this problem with the formation of the Arctic Goose Habitat Working Group whose purpose is to provide recommendations for a solution. Although many methods were recommended by the group to achieve the goal of population reduction, sport hunting was the preferred method. Hunting was selected because harvest by hunters is an acceptable utilization of this resource and hunters are considered "a highly motivated, well equipped and economical labor force ... with a widely demonstrated commitment to waterfowl conservation" (Batt et al., 1997). The use of hunting as a tool to control the MCP

was also supported by a majority of the participants in the MCP workshops held throughout the central and Mississippi flyways (Arnold, 1997).

In an effort to increase harvest of the MCP the U.S. Fish and Wildlife Service implemented a light goose conservation order (64 FR 7517 and Arctic Tundra Habitat Emergency Conservation Act, 1999) that permits the hunting of light geese, with fewer restrictions, during a new spring season. This extra harvest beyond the traditional fall/winter hunting season is expected to help reduce population growth of the MCP to sustainable levels.

The recommended harvest level needed to decrease the MCP 50% by 2005 was 1,410,000 geese/year (Rockwell and Ankey, 2000). During the 1999/2000 hunting season approximately 1,488,633 geese were harvested from the MCP, slightly exceeding the recommended harvest level (U.S. Fish and Wildlife Service, 2004). The additional harvest attributed to this alternative may decrease the time necessary to reduce the MCP to population levels that the arctic breeding ground habitat can support which may, in turn, prevent additional damage to this habitat.

Small numbers of non-target migratory species including Canada geese (*Branta canadensis*), white-fronted geese (*Anser albifrons*), mallard (*Anas platyrhynchos*) and Northern pintail (*Anas acuta*) may be found within flocks of MCP light geese, however there is no open hunting season for these species during the Spring Light Goose Conservation Order Hunting Season, resulting in no direct impact to these species.

Disturbance from hunting on the proposed hunt site may indirectly impact these non-target species by excluding them from feeding on the waste grain located on the site, however this disturbance will be limited due to the minimal number that use the site and/or typically occur within MPC light goose flocks, resulting in minimal or no indirect impact on non-target species. Additionally, any waste grain remaining on the proposed hunt site will be available to these species in the afternoon, after 1:00 PM when the hunt closes.

Endangered Species

Three Federal threatened/endangered species and one Federal candidate species use the refuge. These include the bald eagle (*Haliaeetus leucocephalus*), piping plover (*Charadrius melodus*), least tern (*Sterna antillarum*), and Eastern massasauga rattlesnake (*Sistrurus catenatus*).

The piping plover and least tern are occasional visitors of the refuge with approximately 2-3 sightings per/year. They typically do not occur on the refuge during the Spring Light Goose Conservation Order Hunting Season and they do not use the agricultural cropland on the refuge. Encounters between these species and hunt participants are highly unlikely. These temporal and spatial differences, relative to the location and timing of the proposed hunting activity, preclude them

from being negatively impacted by such activity. An Intra-Service Section 7 Biological Evaluation resulted in a “No Effect” determination for both species (Appendix 2).

Eastern massasauga rattlesnakes do not use the agricultural cropland on the refuge and are hibernating during a significant portion of the Spring Light Goose Conservation Order Hunting Season. Encounters between this species and hunt participants are highly unlikely. These temporal and spatial differences, relative to the location and timing of the proposed hunting activity, preclude them from being negatively impacted by such activity. An Intra-Service Section 7 Biological Evaluation resulted in a “No Effect” determination for this species (Appendix 2).

The bald eagle is the only Federal threatened or endangered species that actively utilizes the refuge during the time period coinciding with the Spring Light Goose Conservation Order Hunting Season. This species, which is migrating during the same time period as light geese and other waterfowl, are abundant on the refuge during this time period. Up to 144 bald eagles have been recorded on the refuge during the spring migration and breeding period. One pair of bald eagles has continually nested and fledged several young on the refuge over the past 8 years.

To mitigate any possible disturbance to bald eagles, the hunt boundaries were constructed at least one-quarter of a mile from known perching and roosting sites and one and one-half miles from the nesting site to avoid disturbing bald eagles. The daily duration of the proposed hunting activity is also limited to one-half day to decrease potential disturbance to bald eagles. These mitigation factors should preclude bald eagles from being negatively impacted by the proposed hunting activity. An Intra-Service Section 7 Biological Evaluation resulted in a “May Effect But Not Likely To Adversely Effect Species/Critical Habitat” determination for bald eagles (Appendix 2).

B. Anticipated Direct and Indirect Impacts of Proposed Action on refuge Programs, Facilities, and Cultural Resources.

Refuge Facilities and User Conflicts

Approximately 30,000 visitors use the refuge to view migrating light geese and other birds during this time period. Hunters pursuing light geese are also using the adjacent private lands during this time period. Direct conflict between refuge hunt participants and visitors and off-refuge hunters will be reduced by limiting hunter access to the State Highway 118 entrance, a non-public access entrance, by not permitting hunting within ¼ mile of the auto tour loop road (Figure 1), and not permitting hunters to retrieve crippled geese outside of the hunt boundary. These measures should result in little or no direct or indirect impact to other refuge wildlife-dependant recreational programs such as wildlife observation, wildlife photography, wildlife interpretation, environmental education or fishing.

The use of the State Highway 118 access road to the refuge by hunt participants may result in extra wear to this road. To mitigate this potential damage to refuge facilities the refuge will gravel this portion of the access road. No other refuge facilities will be directly or indirectly impacted by the proposed hunting activity.

Cultural Resources

The proposed hunting activity will take place in an agricultural field that has been in agricultural production for approximately 20 years and will have no direct or indirect impact on known archaeological and cultural resources.

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

Refuge Natural Environment

The proposed hunting activity will take place in an agricultural field that has been in agricultural production for approximately 20 years and will have no direct or indirect impact on the refuge's water, air or soil quality and the refuge's ability to restore and manage habitat.

Impact on Adjacent Lands and Nearby Residents

The refuge does not contain any private in-holdings and participants in the proposed hunting activity will only be allowed to access the hunting site. Additionally, boundary signs mark both the refuge boundary and the hunt site which should prevent trespassing on adjacent private lands. These measures should result in no impact to adjacent public and private lands.

The private land east of the hunting site is in agricultural production and the nearest residence is approximately one half mile north of the hunting site, resulting in minimal or no impact to nearby residents. Several portions of this agricultural land may be hunted during the spring light goose conservation order hunting season however the addition of a refuge hunt should have minor impacts on other hunters and in some cases may increase the success of these hunters by moving geese from the proposed hunt site.

Economic Impacts

Wildlife related recreation, including hunting, is an important part of the local economy and the tourism dollars, including the revenue to the guide service, generated by the proposed hunting activity may have some limited, positive impact on the area. Refuge staff will be required to spend some additional time for managing the hunt and gravel will be purchased for the access road, but there will be no negative economic impact to the refuge.

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

The only other hunting that currently takes place on the refuge is the annual muzzleloader white-tailed deer hunt which was initiated in 1988 to help reduce deer numbers and damage to refuge habitats. This hunt typically takes place during the first weekend of January, each year, and is limited to the northern half of the refuge. Although the deer hunt boundary includes all of the proposed light goose hunt boundary, this hunt will have no impact on the proposed light goose hunt which begins approximately two months after the deer hunt ends or the MCP of light geese.

The Service has no plans to open any additional hunts on Squaw Creek NWR in the foreseeable future.

E. Anticipated Impacts if Individual Hunts are Allowed to Accumulate

The proposed hunting activity may impact the MCP of light geese at the local, regional and flyway level. However this impact, the reduction of the MCP of light geese, is the desired effect. Based on the spatial and temporal scale of the proposed hunting activity and the existing white-tailed deer hunt there will be no cumulative impact to refuge programs or the refuge environment.

4.4.8 Public Use

Limited public hunting on the proposed light goose hunting area will result in a quality hunting experience for hunt participants and decrease potential hunter safety issues.

There is limited potential for conflict with other recreational uses, especially wildlife viewing, during the hunt period. The use of a designated hunting area away from the auto tour route and a hunter parking area away from other public use areas will mitigate any potential impact.

Hunting pressure may impact the number and duration of stay for light geese using the Refuge. This may, in turn, affect wildlife viewing opportunities. The reaction of light geese to this hunt will be closely monitored by refuge staff and appropriate measures, including closing the hunt, will be implemented if necessary to mitigate any impact.

4.4.9 Socioeconomics

This alternative will result in a greatly increased need for refuge staff time in order to regulate hunter numbers by having daily hunter access drawings. This will also result in fiscal and personnel needs that exceed the current refuge staffing plan and budget.

This alternative may have a positive impact on the local community by increasing the amount of local goods and services purchased by hunters participating in the proposed hunting activity.

4.4.10 Public Perception

Recreational hunting is widely accepted in the local area. Limited conflict is expected from the non-consumptive recreational public that utilizes the refuge. Complaints will serve as an opportunity to educate the public about the light goose problem and the use of hunting as a wildlife management tool.

Other limited public conflict may include complaints from owners/users of local duck clubs neighboring the Refuge and local hunters who may be concerned with the potential effects of the refuge light goose hunting program on their own hunting properties or opportunities. Complaints will serve as opportunities to educate the public about hunting as a compatible use of the refuge and as a wildlife management tool.

4.5 Summary of Environmental Consequences by Alternative

Table 2. Comparison of impacts by issue and alternative.

Issue	Alternative A Guided Light Goose Hunt (Proposed Alternative)	Alternative B No Action	Alternative C Unlimited Public Hunting	Alternative D Limited Public Hunting
Habitat Impacts	No impact on Refuge habitat. This alternative may have a positive impact on the artic breeding ground habitat.	No impact on Refuge habitat. This alternative may result in a <u>slower</u> recovery for the artic breeding ground habitat.	No impact on Refuge habitat. This alternative may have a positive impact on the artic breeding ground habitat.	No impact on Refuge habitat. This alternative may have a positive impact on the artic breeding ground habitat.
Biological Impacts	This alternative may result in a negative, short term, impact on MCP of light geese but a long term positive benefit through the overall reduction of the population.	This alternative will not result in the additional harvest of the MCP of light geese.	This alternative may result in a negative, short term, impact on MCP of light geese but a long term positive benefit through the overall reduction of the population.	This alternative may result in a negative, short term, impact on MCP of light geese but a long term positive benefit through the overall reduction of the population.
Listed, Proposed and Candidate Species	Potential impact on the bald eagle that is mitigated by the placement of the hunt area.	No impact.	Potential impact on the bald eagle that is mitigated by the placement of the hunt area.	Potential impact on the bald eagle that is mitigated by the placement of the hunt area.
Cultural Resources	No impact.	No impact.	No impact.	No impact.
Environmental Justice	This alternative may negatively impact low income populations that can not afford a guided hunt. This is mitigated by the presence of other public lands near the refuge that allow free public access for light goose hunting.	No impact.	No impact.	No impact.

Table 2 Continued.

Issue	Alternative A Guided Light Goose Hunt (Proposed Alternative)	Alternative B No Action	Alternative C Unlimited Public Hunting	Alternative D Limited Public Hunting
Cumulative Impacts	<p>This alternative may result in a larger cumulative harvest of MCP light geese which may decrease the recovery time of the arctic breeding ground habitat. No other cumulative impacts to the refuge programs or the refuge environment will occur.</p>	<p>This alternative may cumulatively impact the MCP of light geese and other migratory bird species that share the MCP light goose arctic breeding grounds. By not facilitating the reduction of the MCP of light geese, their continuing negative impact on the arctic breeding ground habitat will be perpetuated.</p>	<p>This alternative may result in a larger cumulative harvest of MCP light geese which may decrease the recovery time of the arctic breeding ground habitat. No other cumulative impacts to the refuge programs or the refuge environment will occur.</p>	<p>This alternative may result in a larger cumulative harvest of MCP light geese which may decrease the recovery time of the arctic breeding ground habitat. No other cumulative impacts to the refuge programs or the refuge environment will occur.</p>
Public Use	<p>This alternative will result in a quality hunting experience.</p> <p>Conflict with other public uses is limited.</p> <p>Hunting pressure may impact the number and duration of stay for light geese. This will be monitored and appropriate action taken if necessary.</p>	<p>This alternative will not result in any new public use opportunities on the Refuge.</p>	<p>This alternative will result in a <u>poor</u> quality hunting experience and increased hunter safety issues.</p> <p>Conflict with other public uses is limited.</p> <p>Hunting pressure may impact the number and duration of stay for light geese. This will be monitored and appropriate action taken if necessary.</p>	<p>This alternative will result in a quality hunting experience.</p> <p>Conflict with other public uses is limited.</p> <p>Hunting pressure may impact the number and duration of stay for light geese. This will be monitored and appropriate action taken if necessary.</p>

Table 2 Continued.

Issue	Alternative A Guided Light Goose Hunt (Proposed Alternative)	Alternative B No Action	Alternative C Unlimited Public Hunting	Alternative D Limited Public Hunting
Socioeconomics	This alternative will reduce the need for additional refuge staff time for managing the hunt and will meet the current refuge staffing plan and budget.	No impact.	This alternative will result in an increased need for refuge staff time and may result in fiscal and personnel needs that exceed the current refuge staffing plan and budget.	This alternative will result in fiscal and personnel needs that exceed the current refuge staffing plan and budget.
Socioeconomics (Continued)	This alternative may have a positive impact on the local economy.		This alternative may have a positive impact on the local economy.	This alternative may have a positive impact on the local economy.
Public Perception	<p>Limited conflict is expected from the non-consumptive recreational public that utilizes the refuge.</p> <p>Other limited public conflict may include complaints from owners/users of local duck clubs neighboring the Refuge and local hunters who may be concerned with the potential effects of the refuge light goose hunting program on their own hunting properties or opportunities.</p>	This alternative may negatively impact public perception of the refuge by those who question why we are <u>not</u> having a light goose hunt on the refuge in order to do our part to address the light goose problem.	<p>Limited conflict is expected from the non-consumptive recreational public that utilizes the refuge.</p> <p>Other limited public conflict may include complaints from owners/users of local duck clubs neighboring the Refuge and local hunters who may be concerned with the potential effects of the refuge light goose hunting program on their own hunting properties or opportunities.</p>	<p>Limited conflict is expected from the non-consumptive recreational public that utilizes the refuge.</p> <p>Other limited public conflict may include complaints from owners/users of local duck clubs neighboring the Refuge and local hunters who may be concerned with the potential effects of the refuge light goose hunting program on their own hunting properties or opportunities.</p>

5. List of Preparers

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6. Consultation and Coordination with the Public and Others

Name	Title	Affiliation	Topic
Dave Erickson	Chief, Wildlife Division	Missouri Department of Conservation	Hunting Plan
Andrew Raedeke	State Waterfowl Biologist	Missouri Department of Conservation	Hunting Plan
Mitch Miller	Regional Supervisor, Wildlife Division	Missouri Department of Conservation	Hunting Plan
Charles Scott	Field Supervisor, Ecological services	U.S. Fish and Wildlife Service	Threatened and Endangered Species

The Missouri Department of Conservation concurs and fully supports the regulated consumptive public use of the natural resources associated with the Squaw Creek. The Fish and Wildlife Service also provided an in depth review by the Regional Office personnel and staff biologists. Numerous contacts were made throughout the area of the refuge soliciting comments, views, and ideas into the development of the accompanying hunting plan.

7. Public Comments on Draft EA and Responses

We received two comments on our draft EA titled Implementation of a Light Goose Hunt Plan for Squaw Creek National Wildlife Refuge, that was available for public comment from March 26, 2007 through April 26, 2007. One of these comments was in support of the Service's preferred Alternative in the draft EA. One comment was in opposition to the preferred Alternative.

Comment 1

We received a letter from the Safaris Club International in support of the Service's preferred Alternative. Their comments are noted.

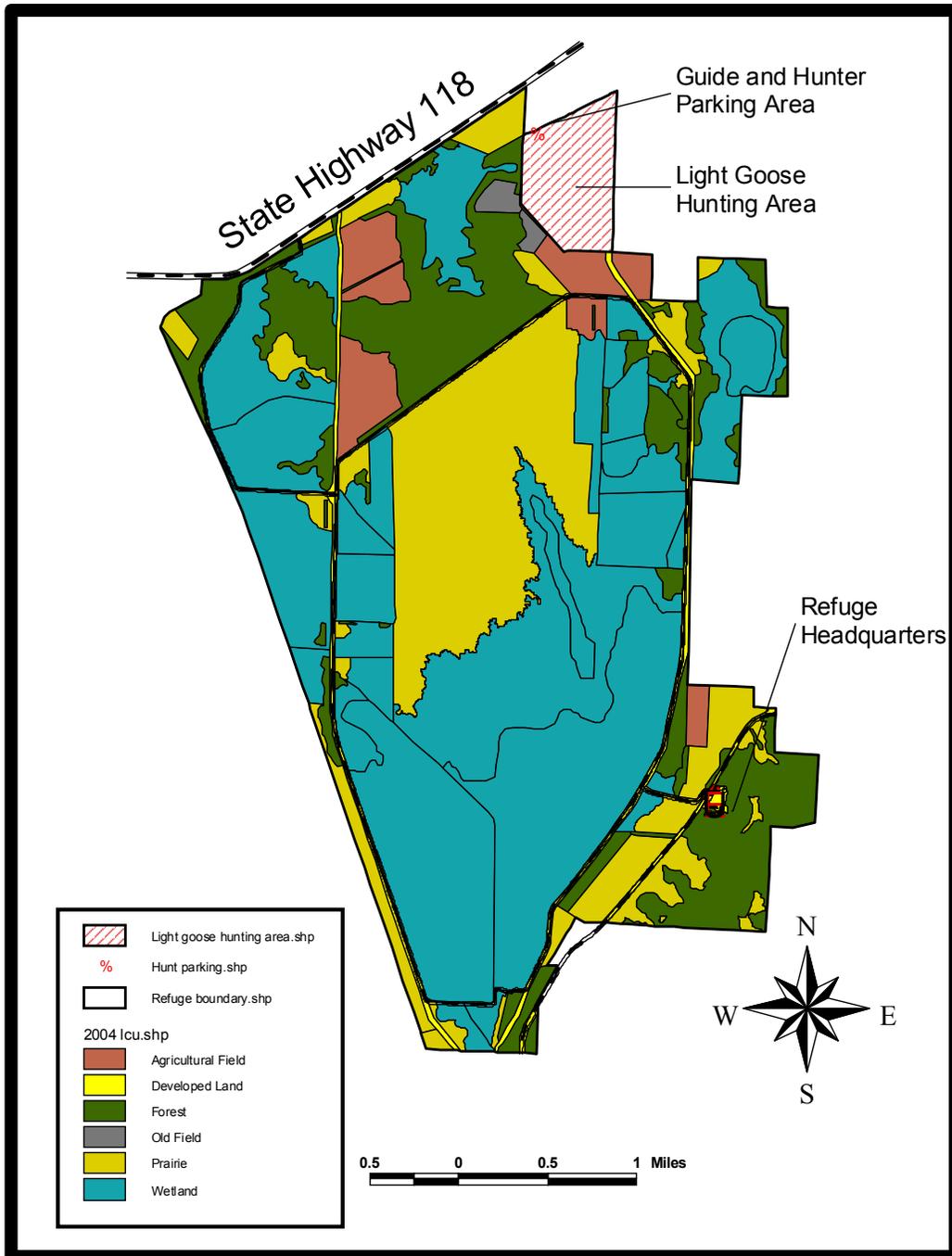
Comment 2

We received a letter from the Humane Society of the United States that 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 Service. These comments were not specific to this draft EA and are noted but not responded to here.

8. References Cited

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- Squaw Creek NWR. 2004. Draft comprehensive conservation plan. U.S. Fish and Wildlife Service, Mound City, Missouri.
- U.S. Fish and Wildlife Service. 2004. Draft environmental impact statement: Light goose management. U.S. Fish and Wildlife Service, Washington, D.C. 255 pp + appendices.

FIGURE 1. Map of Squaw Creek National Wildlife Refuge and light goose hunting area.



Squaw Creek NWR Light Goose Hunt EA Signature Page

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Submitted By: _____ Date: _____
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Concurred By: _____ Date: _____
Jon Kauffeld, Refuge Supervisor

Concurred By: _____ Date: _____
Nita Fuller, Regional Chief

Approved By: _____ Date: _____
Robyn Thorson, Regional Director