COMPATIBILITY DETERMINATION

USE: Snowmobiling

REFUGE NAME: Missisquoi National Wildlife Refuge

DATE ESTABLISHED: February 4, 1943

ESTABLISHING AUTHORITY: Migratory Bird Conservation Act of 1929

PURPOSE FOR WHICH ESTABLISHED

The Missisquoi National Wildlife Refuge was established "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds" [Migratory Bird Conservation Act, 16 U.S.C. 715–715d, and 715f–715r].

MISSION OF THE NATIONAL WILDLIFE REFUGE SYSTEM

"To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

DESCRIPTION OF USE

(a) What is the use? Is it a priority public use?
The use under consideration is to allow snowmobile access and use within the boundaries of the Missisquoi National Wildlife Refuge. Snowmobiling is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd–668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105–57).

(b) Where would the use be conducted?
The use would be conducted on the refuge, in the Towns of Swanton and Highgate, Franklin County, Vermont. The use of snowmobiles would focus primarily on the area of the Headquarters Nature Trail extending to the Lake Champlain Shoreline at First Creek and Maquam Creek. No other portion of the refuge would be open for use by snowmobiles.

(c) When would the use be conducted?
Vermont's snowmobiling season usually starts in mid-December and ends in early April. The use of snowmobiles depends entirely on suitable snow conditions and the waters of Lake Champlain and the Missisquoi River freezing solid near the refuge. Snowmobile access would occur during daytime and nighttime hours.

(d) How would the use be conducted?
We would establish a marked trail from the side of the Missisquoi River at refuge headquarters along the nature trail to Black Creek, thence to Maquam Creek to the shoreline of Lake Champlain at

Maquam Bay. We would post signs to mark the trail and discourage users from entering closed areas. Law enforcement personnel would patrol snowmobile access areas to ensure users are not entering closed areas, and to monitor impacts on other users, wildlife and natural resources. No other portion of the refuge would be open for use by snowmobiles.

(e) Why is this use being proposed?
This use would facilitate the passage of snowmobiles from the Hog Island section of Swanton and other points west of the refuge to points in Swanton and beyond to the east. That would preclude having to take a circuitous route from Hog Island to Swanton or vice versa, and reduce the distance traveled by as much as 12 miles.

Arguably, snowmobile access would facilitate travel for priority public uses on the refuge in the winter. Most snowmobile use near the refuge is for pleasure riding or access to Lake Champlain for ice fishing. The popular fishing locations lie outside the refuge boundary; however, depending on the starting point, snowmobile users may access them most easily via the refuge.

AVAILABILITY OF RESOURCES
Staff time for administering this use would relate to posting trail signs, monitoring the use and its possible impacts on refuge resources and other visitors, and providing information to the public. Law enforcement personnel would be essential to ensure compliance and monitor impacts.

ANTICIPATED IMPACTS OF THE USE
Direct, negative impacts resulting from this use include habitat loss, air pollution, and the disturbance of wildlife and pedestrian visitors.

Impacts on Environmental Quality
In one hour, an unregulated two-stroke snowmobile can emit as much hydrocarbon, carbon monoxide and nitrous oxide as 100 automobiles (EPA 2002). A snowmobile may expel 25 percent to 30 percent of its unburned fuel (gas and oil mix) out its tailpipe. Air pollution at trailheads and along snowmobile trail corridors in areas of heavy use causes increases in acidity and the development of lethal concentrations of nitrogen, sulfate and hydrocarbon compounds in snow.

Pollutants from snowmobile emissions, including benzene, 1,3-butadiene, polycyclic aromatic hydrocarbons (PAH) and methyl tertiary-butyl ether (MTBE) become locked within the snowpack. The U.S. Environmental Protection Agency (EPA) classifies all of those as known or probable human carcinogens. The toxic effects of those accumulated pollutants are magnified during the spring snowmelt (Bluewater Network). Surrounding waterways have higher acidity levels, and correspondingly higher mortality rates of aquatic insects and amphibians. The hydrocarbons and lead emitted from snowmobiles have also been determined to adversely affect brook trout (Adams 1975).

The Vermont Agency of Natural Resources states that nearly all gasoline sold in Vermont contains MTBE (VANR 2002). The amount of MTBE released from a single two-stroke snowmobile may be as much as 800 grams a day, with a significant amount incorporated into the snowpack (Einarson 2002). During the snowmelt, the dissolved MTBE enters nearby surface water and groundwater,

thereby migrating further and more quickly. MTBE does not adhere to soil particles and resists biodegradation (VANR 2002). Low levels of MTBE can make drinking water supplies undrinkable due to its offensive taste and odor (EPA 1997). The EPA states that MTBE in drinking water at concentrations between 20 and 40 parts per billion (ppb) or below is not likely to cause adverse health effects. Vermont's rules on ground water recommend a limit of 40 ppb.

The extent of the impact on environmental quality resulting from the use of snowmobiles would be contingent upon the amount of this activity on or around the refuge. Anticipated activity, while undocumented, would likely result in minimal levels of the environmental quality impacts described above.

Impacts on Wildlife

Snowmobiles have less obvious effects on larger animals, moderate effects on medium-sized animals and drastic effects on small animals, notably those overwintering in sub-snow environments (Bury 1978). Deer are known to be tolerant of the noise produced by snowmobiles and are not seriously effected by the physical impacts (snow compaction) of snowmobiles, although the snowmobile path can provide easier access for predators to deer yarding locations thus producing an indirect impact.

Snowmobile use is likely to impact the small animals that live in the subnivean layer (the space between snow and soil) during the winter time. Jarvinen and Schmid (1971) found marked increases in winter mortality of small mammals underneath snowmobile-compacted snowfields. The snowmobiles compact the snow, destroying air spaces between the snow and soil, reduce snow depth, increase the density of the snow, and decrease snow insulation of the small subnivean air space. The air in the subnivean layer may also become toxic with unusually high amounts of carbon monoxide emitted from snowmobile exhaust (Neumann and Merriam 1972).

The noise produced by snowmobiles may alarm some wintering wildlife and cause them to avoid searching for food near snowmobile trails. The Bureau of Land Management found that the most significant impact of snowmobiles on wildlife appears to be changes in the animals' daily routine rather than direct mortality.

As stated above, toxins emitted from the snowmobiles build up in the snowpack and are released into waterways during spring snowmelt, potentially and probably impacting fish, amphibians and aquatic insects.

Impacts on Other Users

Conflicts may arise between snowmobile users and other users when the two uses converge. Conflicts with other users are often asymmetric. Cross-country skiers and snowshoers tend to feel a conflict with snowmobilers because the noise from snowmobiles disturbs their quiet solitude while visiting the refuge. Likewise, they complain about the smell of the machines' fuel emissions. In those situations, conflicts arise because the motivations for participation of the pedestrian users are compromised and anticipated experiences are unfulfilled (Jackson and Wong 1982). Snowmobilers, on the other hand, may be tolerant or indifferent of the pedestrian users.

Safety problems may also arise when differing uses coincide. Snowmobile users may collide with other users who are snowshoeing or cross-country skiing. Snowmobile users may collide with other snowmobiles or stationary trailside objects such as trees, rocks or signs, resulting in injury or death and property damage. The U.S. Consumer Product Safety Commission reports that hospital emergency rooms in the United States treated an average of 13,400 snowmobile-related injuries from 1990 to 1996. Finally, depending on the number of snowmobiles in use, snowmobile users and other users may be exposed to significant levels of carbon monoxide from snowmobile exhaust emissions, and risk carbon monoxide poisoning.

PUBLIC REVIEW AND COMMENT
As part of the CCP process for Missisquoi National Wildlife Refuge, this compatibility determination will undergo a comment period of 30 days concurrent with the draft CCP/EA. Additionally, we posted this draft compatibility determination at refuge headquarters from August 11-25, 2004. We received no comments.

DETERMINATION (Check one):

THIS USE IS COMPATIBLE ___

THIS USE IS NOT COMPATIBLE X

JUSTIFICATION
We have determined this use to be not compatible. It may materially interfere with or detract from the mission of the National Wildlife Refuge System or diminish the purposes for which the refuge was established. This use may impose significant short- and long-term adverse effects on trust species or other refuge resources, and could interfere substantially with public use of the refuge.

Specifically, we determined that adequate opportunities off-refuge are available for snowmobiling: the frozen waters of Lake Champlain and the Missisquoi River and thousands of acres of private land and other public land, including portions of the Rail Trail system east and west of the refuge. The passage of snowmobiles through the refuge near the nature trails and refuge headquarters creates conflicts among user groups that routing snowmobiles around the refuge can avoid. Likewise, routing snowmobiles around the refuge can avoid the potential impacts on wildlife, including impacts on deer using the Maquam Bog deer wintering area and impacts on subnivean[1] wildlife. Likewise, routing snowmobiles around the refuge can avoid impacts on sensitive wildlife species such as the leopard frog and green frog, which we are studying on the refuge because of the significant percentage of growth abnormalities in sampled populations.

[1] subnivean *adj* : situated or occurring under the snow (~burrows and runways—W.A. Fuller). Webster's Third

Signature: Refuge Manager: _____
(Signature and Date)

Concurrence: Regional Chief: _____
(Signature and Date)

Mandatory 10-year Re-evaluation Date: _____
(Signature and Date)

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