Agriculture and Aquaculture

Threats under the 'agriculture and aquaculture' category (IUCN 2) address impacts from farming and ranching as a result of agricultural expansion and intensification, including silviculture, mariculture and aquaculture. These threats include habitat conversion, disturbance or direct mortality of species. These threats can be placed into three categories (IUCN Level 2):

- Annual and perennial non-timber crops (farms, household swidden plots, plantations, orchards, vineyards, mixed agroforestry systems), crops planted for food, fiber, fuel or other uses.
- Wood and pulp plantations (silviculture, Christmas tree farms), stands of trees planted for timber or fiber outside of natural forests often with non-native species.
- Livestock farming and ranching - domestic terrestrial animals raised in one location on farmed or nonlocal resources; also domestic or semi-domesticated animals allowed to roam in the wild and supported by natural habitats.

Risk Assessment Summary

A total of 48 unique threats were evaluated for agricultural and aquaculture across five habitats and 33 species. The majority of the threat assessment scores were ranked as low (n=33, 69%), followed by moderate (n=12, 25%) and high ranking threats (n=3, 6%). For a summary of threats related to agricultural and aquaculture evaluated for SGCN and habitats, see Table 4-11.

Within this category, grasslands had the highest ranked threats. Mortality and nest disturbance resulting from frequency and timing of mowing, and habitat conversion to cropland or sod, both ranked high in grassland settings. Species having the highest-ranked threats in this category (final overall score of 'moderate') include grasshopper sparrow and northern harrier for issues related to mowing, and common and roseate terns for habitat degradation from aquaculture contamination.

Threats associated with annual and perennial non-timber crops were the primary type of agricultural issues identified in the habitat and species risk assessment. Most of these threats were related to unintentional mortality of species from mowing and the use of agricultural machinery. Mowing was identified as a potential issue for thirteen SGCN, and ranked a 'moderate' threat or higher for six of these species. Livestock farming and ranching was evaluated only for grasslands, and was evaluated as a low threat.

Known Wildlife Exposure Pathways

Hay Cropping

Mowing practices, such as haying before July 15, are in use throughout the state and are known to present a moderate to high threat to grassland nesting species such as bobolink, eastern meadowlark, vesper sparrow, and the state endangered grasshopper sparrow. Farmers mow their hayfields 2-3 times during the summer to provide high quality forage for livestock. The peak nesting period for grassland nesting birds is mid-May through mid-July, coinciding with the first and second hay crops. Reproduction is reduced through direct mortality of eggs and nestlings or subsequent egg and chick loss

caused by nest abandonment or predation on exposed nests (Bollinger et al. 1990). Death by collision with mowing equipment is a localized but high-ranking problem for wood turtle and a moderate threat to northern leopard frog.

Habitat Conversion
Conversion of Grassland and Floodplain Forest habitats are both ranked as a moderate risk, with somewhat localized but catastrophic consequences where it occurs. Conversion of floodplains to agriculture has led to significant losses of natural floodplain habitat historically. While there is much opportunity for restoration, there is a low likelihood of future losses of floodplain habitat to agriculture. The conversion of grasslands to cropland and sod farms will reduce the amount of habitat available to grassland-dependent species. Active agricultural land acreage dropped by 50% in Rockingham and Strafford Counties between 1962 and 1998. The loss of agriculture to other non-grassland habitat uses reduces the amount of potential quality habitat available to grassland-dependent species.

Species specific risks from habitat conversion include herbicide applications on crop lands, which reduces the amount of milkweed available for monarch butterflies. In addition, habitat conversion to agriculture of winter grounds outside of the U.S. ranked moderate and high for Wood thrush and Bicknell's Thrush. Widespread conversion to agriculture has occurred in the bottomland hardwood forests in the Rusty Blackbird's primary wintering range, ranking as a high threat for the species.

Pesticides and Runoff
See the threat category summary for 'Pollution' for detailed information.

Research Needs

- Survey existing large grasslands for important bird species and current management practices.
- Identify and assess threats (e.g., land use practices in agricultural areas) to specific populations of wood turtles.
- Demographic studies on monarch butterflies in NH and mapping of existing large patches of habitat in the state.

Literature Cited

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Francis F., and A. Mulligan. 1997. Connecticut River Corridor Management Plan. Connecticut River Joint Commission. Charlestown, New Hampshire, USA.

Saumure, R. A., and J. R. Bider. 1998. Impact of agricultural development on a population of wood turtles (*Clemmys insculpta*) in southern Quebec, Canada. Chelonian Conservation and Biology 3:37-45.

United States Department of Agriculture. 2004. 2002 census of agriculture. National Agricultural Statistics Service, U.S. Department of Agriculture, Washington, D.C. http://www.nass.usda.gov/census/.

Table 4-11. Habitats and species at highest risk from the effects of agriculture and aquaculture (threats ranked as *Low* not included). Some habitats were evaluated for multiple specific threats separately and therefore listed multiple times below. See Appendix E for detailed threat ranking methodology.

Habitat	IUCN Level 2	Overall Threat Score
Grasslands	Annual & perennial non-timber crops	M
Floodplain Forests	Not Specified	M
Common Name		**Overall Threat Score**
Bicknell's Thrush*	Not Specified	H
Bobolink	Annual & perennial non-timber crops	M
Eastern Meadowlark	Annual & perennial non-timber	M
Grasshopper Sparrow	Annual & perennial non-timber crops	M
Monarch	Annual & perennial non-timber crops	M
Northern Leopard Frog	Annual & perennial non-timber crops	M
Rusty Blackbird*	Annual & perennial non-timber crops	H
Vesper Sparrow	Annual & perennial non-timber crops	M
Wood Thrush*	Not Specified	M
Wood Turtle	Not Specified	H

** Wintering grounds outside NH*