

Consultation on the Impacts of Adding Three Bat Species to the List of Species under the *Species at Risk Act* – July 2014

Également disponible en français

Please submit your comments by **August 18, 2014**

Please email your comments to the Species at Risk Public Registry at:
sararegistry@ec.gc.ca

Comments may also be mailed to:
Director General
Canadian Wildlife Service
Environment Canada
Ottawa ON K1A 0H3

For more information on the *Species at Risk Act*, please visit the Species at Risk Public Registry at:
www.sararegistry.gc.ca

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ADDITION OF SPECIES TO THE *SPECIES AT RISK ACT*

The *Species at Risk Act* and the List of Wildlife Species at Risk

The Government of Canada is committed to preventing the disappearance of wildlife species from our lands. As part of its strategy for realizing that commitment, on June 5, 2003, the Government of Canada proclaimed the *Species at Risk Act* (SARA). Attached to the Act is Schedule 1, the list of the species provided for under SARA, also called the List of Wildlife Species at Risk.

Extirpated, Endangered and Threatened species on Schedule 1 benefit from the protection of prohibitions and recovery planning requirements under SARA. Special Concern species benefit from its management planning requirements. Schedule 1 has grown from the original 233 to 518 wildlife species at risk.

The complete list of species currently on Schedule 1 can be viewed at:

www.sararegistry.gc.ca/species/schedules_e.cfm?id=1

Species become eligible for addition to Schedule 1 once they have been assessed as being at risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The decision to add a species to Schedule 1 is made by the Governor in Council following a recommendation from the Minister of the Environment. The Governor in Council is the formal executive body that gives legal effect to decisions that are to have the force of law.

COSEWIC and the assessment process for identifying species at risk

COSEWIC is recognized under SARA as the authority for assessing the status of wildlife species at risk. COSEWIC comprises experts on wildlife species at risk. Its members have backgrounds in the fields of biology, ecology, genetics, Aboriginal traditional knowledge and other relevant fields. They come from various communities, including academia, Aboriginal organizations, government and non-governmental organizations.

COSEWIC gives priority to those species more likely to become extinct, and then commissions a status report for the evaluation of the species' status. To be accepted, status reports must be peer-reviewed and approved by a subcommittee of species specialists. In special circumstances, assessments can be done on an emergency basis. When the status report is complete, COSEWIC meets to examine it and discuss the species. COSEWIC then determines whether the species is at risk, and if so, then assesses the level of risk and assigns a conservation status.

Any person who considers that there is an imminent threat to the survival of a wildlife species may apply to COSEWIC for an assessment of the threat for the purpose of having the species listed on Schedule 1 on an emergency basis as endangered.

Terms used to define the degree of risk to a species

The conservation status defines the degree of risk to a species. The terms used under SARA are Extirpated, Endangered, Threatened and Special Concern. Extirpated species are wildlife species that no longer occur in the wild in Canada but still exist elsewhere. Endangered species are wildlife species that are likely to soon become extirpated or extinct. Threatened species are likely to become endangered if nothing is done to reverse the factors leading to their extirpation or extinction. The term Special Concern is used for wildlife species that may become threatened or endangered due to a combination of biological characteristics and threats. Once COSEWIC has assessed a species as Extirpated, Endangered, Threatened or Special Concern, it is eligible for inclusion on Schedule 1.

For more information on COSEWIC, visit: www.cosewic.gc.ca

On February 22, 2012, COSEWIC sent to the Minister of the Environment emergency assessments for three bat species at risk. In November, 2013 COSEWIC re-examined the status and confirmed it. See Table 1. Environment Canada is now consulting on changes to Schedule 1 to reflect these new designations for these species.

Comments solicited on the potential impacts of listing species on Schedule 1

The conservation of wildlife is a joint legal responsibility shared among the governments of Canada. But biodiversity will not be conserved by governments that act alone. The best way to secure the survival of species at risk and their habitats is through the active participation of all those concerned. Please share your comments concerning the addition of these species to Schedule 1 of SARA.

Your comments are considered in relation to the potential consequences of whether or not a species is included on Schedule 1, and they are then used to draft the Minister's proposed listing recommendations for each of the species. To ensure that your comments are considered in time, they should be submitted before **August 18, 2014**.

Comments received by the deadline will be considered in the development of the listing proposal.

Please email your comments to the Species at Risk Public Registry at:
sararegistry@ec.gc.ca

Thank you for your consideration of this request and any information you provide.

By regular mail, please address your comments to:
Director General
Canadian Wildlife Service
Environment Canada
Ottawa ON K1A 0H3

THE *SPECIES AT RISK ACT* LISTING PROCESS

The addition of a wildlife species at risk to Schedule 1 of SARA strengthens and enhances the federal government's capacity to provide for its protection and conservation. To be effective, the listing process must be transparent and open.

When COSEWIC assesses a wildlife species, it does so solely on the basis of the best available information relevant to the biological status of the species. COSEWIC then submits the assessment to the Minister of the Environment, who considers it when making the listing recommendation to the Governor in Council. Consultations provide the Minister with a better understanding of the potential social and economic impacts of the proposed change to the List of Wildlife Species at Risk, and of the potential consequences of not adding a species to the List.

Legislative context: the Minister's recommendation to the Governor in Council

Having received an assessment from COSEWIC, the Minister may make a recommendation to the Governor in Council with respect to amending the list. Comments collected during consultations inform the Governor in Council's consideration of the Minister's recommendations for listing species at risk.

In most cases, it is difficult for Environment Canada to fully examine the potential impacts of recovery actions when species are being considered for listing. Recovery actions for terrestrial species usually have not yet been comprehensively defined at the time of listing, so their impact cannot be fully understood. Once they are defined, efforts are made to minimize adverse social and economic impacts of listing and to maximize the benefits. SARA requires that recovery measures be prepared in consultation with those considered to be directly affected by them.

SIGNIFICANCE OF THE ADDITION OF A SPECIES TO SCHEDULE 1

The protection that comes into effect following the addition of a species to Schedule 1 depends upon a number of factors. These include the species' status under SARA, the type of species and where it occurs.

Protection for listed Extirpated, Endangered and Threatened species

Responsibility for the conservation of wildlife is shared among the governments of Canada. SARA establishes legal protection of individuals and their residences as soon as a species is listed as Threatened, Endangered or Extirpated, if they are considered federal species or if they are found on federal land.

Federal species include migratory birds, as defined by the *Migratory Birds Convention Act, 1994*, and aquatic species covered by the *Fisheries Act*. Federal land means land that belongs to the federal government, and the internal waters and territorial sea of Canada. It also means land set apart for the use and benefit of a band under the *Indian Act* (such as reserves). In the territories, the protection for species at risk on federal lands applies only where they are on lands under the authority of the Minister of the Environment or the Parks Canada Agency.

Migratory birds are protected by the *Migratory Birds Regulations*, under the *Migratory Birds Convention Act, 1994*, which strictly prohibits the harming of migratory birds and the disturbance or destruction of their nests and eggs.

Protection under SARA makes it an offence to kill, harm, harass, capture or take an individual of a species listed as Extirpated, Endangered or Threatened. It is also an offence to damage or destroy the residence of one or more individuals of an Endangered or Threatened species or an Extirpated species whose reintroduction has been recommended by a recovery strategy. The Act also makes it an offence to possess, collect, buy, sell or trade an individual of a species that is Extirpated, Endangered or Threatened.

Species at risk that are neither aquatic nor protected under the *Migratory Birds Convention Act, 1994*, nor on federal lands, do not receive immediate protection upon listing under SARA. Instead, in most cases, the protection of terrestrial species on non-federal lands is the responsibility of the provinces and territories where they are found. The application of protections under SARA to a species at risk on non-federal lands requires that the Governor in Council make an order defining those lands. This can only occur when the Minister is of the opinion that the laws of the province or territory do not effectively protect the species. To put such an order in place, the Minister would then need to recommend the order be made to the Governor in Council. If the Governor in Council agrees to make the order, the prohibitions of SARA would then apply to the provincial or territorial lands specified by the order. The federal government would consult before making such an order.

Permits and Agreements

For terrestrial species listed on SARA Schedule 1 as Extirpated, Endangered or Threatened, the Minister of the Environment may authorize exceptions to the Act's prohibitions, when and where they apply. The minister can enter into agreements or issue permits only for one of three reasons: for research, for conservation activities, or if the effects to the species are incidental to the activity. Research must relate to the conservation of a species and be conducted by qualified scientists. Conservation activities must benefit a listed species or be required to enhance its chances of survival. All activities, including those that incidentally affect a listed species, must also meet certain conditions. First, it must be established that all reasonable alternatives have been considered and the best solution has been adopted. It must also be established that all feasible measures will be taken to minimize the impact of the activity, and finally that the survival or recovery of the species will not be jeopardized. Having issued a permit or agreement, the Minister must then include an explanation on the Species at Risk Public Registry of why the permit or agreement was issued.

Recovery strategies and action plans for Extirpated, Endangered and Threatened species

Recovery planning results in the development of recovery strategies and action plans for Extirpated, Endangered or Threatened species. It involves the different levels of government responsible for the management of the species, depending on what type of species it is and where it occurs. These include federal, provincial and territorial governments as well as Wildlife Management Boards. Recovery strategies and action plans are also prepared in cooperation with directly affected Aboriginal organizations. Landowners and other stakeholders directly affected by the recovery strategy are consulted to the extent possible.

Recovery strategies must be prepared for all Extirpated, Endangered and Threatened species. They include measures to mitigate the known threats to the species and its habitat and set the population and distribution objectives. Other objectives can be included, such as stewardship (to establish protection for an existing population) or education (to increase public awareness). Recovery strategies must include a statement of the time frame for the development of one or more action plans. To the extent possible, recovery strategies must also identify the critical habitat of the species. If there is not enough information available to identify critical habitat, the recovery strategy includes a schedule of studies required for its identification. This schedule outlines what must be done to obtain the necessary information and by when it needs to be done. In such cases critical habitat can be identified in a subsequent action plan.

Proposed recovery strategies for newly listed species are posted on the Species at Risk Public Registry to provide for public review and comment. For Endangered species, proposed recovery strategies are posted within one year of their addition to Schedule 1, and for Threatened or Extirpated species within two years.

Action plans state the measures necessary to implement the recovery strategy. These include measures to address threats and achieve the population and distribution objectives. Action plans also complete the identification of the critical habitat where necessary, and to the extent possible state measures that are proposed to protect it.

Protection for listed species of Special Concern

While immediate protection under SARA for species listed as Extirpated, Endangered and Threatened do not apply to species listed as Special Concern, any existing protections and prohibitions, such as those provided by the *Migratory Birds Convention Act, 1994* or the *Canada National Parks Act*, continue to be in force.

Management plans for species of Special Concern

For species of Special Concern, management plans are to be prepared and made available on the Species at Risk Public Registry within three years of species' addition to Schedule 1, allowing for public review and comment. Management plans include appropriate conservation measures for the species and for its habitat. They are prepared in cooperation with the jurisdictions responsible for the management of the species, including directly affected Wildlife Management Boards and Aboriginal organizations. Landowners, lessees and others directly affected by a management plan will also be consulted to the extent possible.

SPECIES ELIGIBLE FOR AN AMENDMENT TO SCHEDULE 1

Table 1: Bat species currently under consideration for listing

Taxon	Species	Scientific Name	Range
Endangered (3)			
Mammals	Little Brown Myotis	<i>Myotis lucifugus</i>	YT NT BC AB SK MB ON QC NB PE NS NL
Mammals	Northern Myotis	<i>Myotis septentrionalis</i>	YT NT BC AB SK MB ON QC NB PE NS NL
Mammals	Tri-colored Bat	<i>Perimyotis subflavus</i>	ON QC NB NS

QUESTIONS TO GUIDE YOUR INPUT

Questions follow to assist you in providing comments and information on amending the list of species under SARA. As the listing of the three bat species would protect individual bats and their residences on federal land only, this consultation is also seeking information on implications of voluntary stewardship actions whether on or off of federal lands that could be undertaken by those well placed to assist in the survival and recovery of these species.

More detailed information on the biology of the three bat species and threats to them follow. The key activities needed to provide for the survival and recovery of these species relate to preventing the human-assisted spread from one hibernaculum to another of a fungus that causes a debilitating disease in these bats. Key activities also relate to avoiding the killing of the few remaining bats once the bats in any area have been exposed to the fungus.

A bat hibernaculum is a cave or abandoned mine where bats hibernate over winter. Preventing the human assisted spread of the fungus will depend on the actions of those people who frequent caves or abandoned mines where bats

hibernate. Such actions could include decontaminating or replacing clothing, footwear and/or equipment.

If these three bat species are to survive and recover, ideally hibernacula would not be destroyed or otherwise not made unusable or unsuitable for bats. In addition, maternal colonies and summer roosts would be maintained and sources of mortality reduced or eliminated. Achieving such objectives will depend on the actions of pest control companies, forest managers and wind turbine operators to ensure that colonies or roosts are not made unusable or unsuitable for bats or bats are not harmed or killed by their activities.

As noted, the following questions are intended to assist you in providing comments. They are not limiting and any other comments you may have are welcome. We also encourage you to share descriptions and estimates of costs and benefits where possible.

Listing of the Three Bat Species under SARA

1. Impact on Your Activities: Based on what you know about the *Species at Risk Act* and the information presented in this document, do you think adding any or all of the three bat species to the SARA List would have no impact, a positive impact or a negative impact on your activities? What are the implications of such impacts?
2. Impact of Your Activities: Might any of your activities have an impact on any of the three bat species or their habitat such that you would have to avoid or adjust your activities to mitigate their impact? What are the implications of any such avoidance or mitigation?
3. Economic Benefits: Do you think that listing any or all of the three bat species would have economic benefits to you, your community, or your organization?
4. Environmental/Ecosystem Benefits: Do you think that listing any or all of the three bat species would have any benefits to the environment or ecosystem?
5. Cultural/Social Benefits: Do you think that listing any or all of the three bat species would have cultural or social benefits for you, your community or your organization?
6. Economic Costs: Do you think that listing any or all of the three bat species would have economic costs for you, your community, or your organization?

7. Environmental/Ecosystem Costs: Do you think that listing any or all of the three bat species would have any costs to the environment or ecosystem?

8. Cultural/Social Costs: Do you think that listing any or all of the three bat species would have cultural or social costs for you, your community or your organization?

9. Are you in favour of the Government of Canada listing any or all of the three bat species under the Species at Risk Act as Endangered? Why?

Voluntary stewardship actions for the conservation of bats

As noted, we are also looking for feedback on priorities to enhance and implement a national plan for bat conservation in cooperation with other jurisdictions and interested participants.

10. You are invited to propose activities that you could undertake to help conserve and recover the bats. These could be in relation to the following:

- preventing the spread of White-nose Syndrome from one bat hibernaculum to others through human activities such as visiting caves recreation, research or resource extraction
- developing and implementing best management practices to reduce bat mortality during, for example,
 - wind turbine operation
 - pest control
 - forestry
- public education or education within your business sector

11. We are also interested in the implications of any such actions or activities that you may undertake to address the threats to these bats and contribute to the national plan for the species.

THE COSEWIC SUMMARIES OF TERRESTRIAL SPECIES ELIGIBLE FOR ADDITION OR RECLASSIFICATION ON SCHEDULE 1

The following section presents the Assessment Summaries and Executive Summary from the regular COSEWIC status report prepared following the emergency assessment reports. The former report has not yet been presented to the Minister of the Environment, may not be quoted, and should be considered a draft version. It includes a brief summary of the reasons for the COSEWIC status designation of individual species followed by summarized accounts of their biology, threats, distribution and other information. The complete emergency assessments are available on the Species at Risk Public Registry at:

www.sararegistry.gc.ca

or contact:
COSEWIC Secretariat
c/o Canadian Wildlife Service
Environment Canada
Ottawa ON K1A 0H3

Little Brown Myotis

Previous common name: Little Brown Bat

Scientific name: *Myotis lucifugus*

Status: Endangered

Reason for designation:

Approximately 50% of the global range of this small bat is found in Canada. Sub-populations in the eastern part of the range have been devastated by White-nose Syndrome, a fungal disease caused by an introduced pathogen. This disease was first detected in Canada in 2010, and to date has caused a 94% overall decline in known numbers of hibernating *Myotis* bats in Nova Scotia, New Brunswick, Ontario, and Québec. The current range of White-nose Syndrome has been expanding at an average rate of 200-250 kilometres per year. At that rate, the entire Canadian population is likely to be affected within 12 to 18 years. There is no apparent containment of the northward or westward spread of the pathogen, and proper growing conditions for it exist throughout the remaining range.

Occurrence:

Yukon, Northwest Territories, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Prince Edward Island, Nova Scotia, Newfoundland and Labrador

Northern Myotis

Other common name: Northern Long-eared Bat, Northern Long-eared Myotis

Scientific name: *Myotis septentrionalis*

Status Endangered

Reason for designation:

Approximately 40% of the global range of this northern bat is in Canada. Sub-populations in the eastern part of the range have been devastated by White-nose Syndrome, a fungal disease caused by an introduced pathogen. This disease was first detected in Canada in 2010 and to date has caused a 94% overall decline in numbers of known hibernating *Myotis* bats in Nova Scotia, New Brunswick, Ontario, and Québec hibernacula compared with earlier counts before the disease struck. Models in the northeastern United States for Little Brown *Myotis* predict a 99% probability of functional extirpation by 2026. Given similar life history characteristics, these results are likely applicable to this species. In addition to its tendency to occur in relatively low abundance levels in hibernacula, there is some indication this species is experiencing greater declines than other species since the onset of White-nose Syndrome. The current range of White-nose Syndrome overlaps with approximately one third of this species' range and is expanding at an average rate of 200 to 250 kilometres per year. At that rate, the entire Canadian population will likely be affected within 12 to 18 years. There is no apparent containment of the northward or westward spread of the pathogen, and proper growing conditions for it exist throughout the remaining range.

Occurrence:

Yukon, Northwest Territories, British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Prince Edward Island, Nova Scotia, Newfoundland and Labrador

Tri-colored Bat

Other common name: Eastern Pipistrelle

Scientific name: *Perimyotis subflavus*

Status Endangered

Reason for designation

This bat is one of the smallest bats in eastern North America. Approximately 10% of its global range is in Canada, and it is considered rare in much of its Canadian range. Declines of more than 75% have occurred in the known hibernating populations in Québec and New Brunswick due to White-nose Syndrome. This fungal disease, caused by an invasive pathogen, was first detected in Canada in 2010, and has caused similar declines in Little Brown Myotis and Northern Myotis in eastern Canada and the northeastern United States. Most of the Canadian

range of the species overlaps with the current White-nose Syndrome range, and further declines are expected as more hibernacula continue to become infected.

Occurrence:

Ontario, Quebec, New Brunswick, Nova Scotia

Wildlife Species Description and Significance

All three bat species are small (average 7.4 g), brown-pelaged, insectivorous species of the family Vespertilionidae. Little Brown Myotis (*Myotis lucifugus*) likely is the most common bat species in Canada and the most familiar of the three species to the public because they often use buildings as day-roosts and forage in areas where they are visible (e.g., over lakes, around streetlights, etc.). Northern Myotis (*M. septentrionalis*) is common in forests and Tri-colored Bat (*Perimyotis subflavus*) is found in variety of habitats, but is rarer than the other two. Public concern over zoonotic diseases (i.e., rabies, histoplasmosis), noise, and hygiene has resulted in periodic extermination of maternity colonies and/or elimination of their roosts. Bats are predators of insects, some of which are considered pests in the agriculture and forestry sectors, and provide an important ecological service in this regard.

Distribution

In Canada, *Myotis lucifugus* and *M. septentrionalis* occur from Newfoundland to British Columbia, and northward to near the treeline in Labrador, Northwest Territories (NT) and the Yukon. *Perimyotis subflavus* occurs in Nova Scotia (NS), New Brunswick (NB), Québec, and Ontario. All three species occur in much of the eastern half of the United States (US), and *M. lucifugus* extends to the US west coast, including Alaska.

Habitat

All three species overwinter in cold and humid hibernacula (caves/mines). Their specific physiological requirements limit the number of suitable sites for overwintering. In the east, large numbers (i.e., >3000 bats) of several species typically overwinter in relatively few hibernacula. In the west, there are fewer known hibernacula, and numbers appear lower per site. Females establish summer maternity colonies, often in buildings (mainly *Myotis lucifugus*), or large-diameter trees. Foraging occurs over water (mainly *M. lucifugus*, *P. subflavus*), along waterways, forest edges, and in gaps in the forest (mainly *M. septentrionalis*). Large open fields or clearcuts generally are avoided. In autumn, bats return to hibernacula which may be hundreds of kilometres from their summering areas, swarm near the entrance, mate, and then enter that hibernaculum, or travel to different hibernacula to overwinter.

Biology

Breeding is promiscuous. Females produce one pup (potentially two in *Perimyotis subflavus*) after one year of age. Maximum recorded longevity is 15 years (*P. subflavus*) to >30 years (*Myotis lucifugus*). Survivorship is low in year one, then highly variable (e.g., 0.6-0.9) afterwards. Generation time is estimated as 5-10 years for *M. lucifugus* and *M. septentrionalis*, and 5-7 years for *P. subflavus*. Finite population growth rate is slow, with a range of 0.98-1.2.

Population Sizes and Trends

Population sizes are unknown but were likely over a million for each of the *Myotis* species prior to the 2010 arrival in Canada of White-nose Syndrome (WNS), a disease caused by a cold-loving fungus *Pseudogymnoascus destructans* (Pd), likely originating in Europe. *M. lucifugus* and *M. septentrionalis* were considered to be common in much of their range in eastern Canada and northeastern US, and are still common in Canada outside the range of WNS. *Perimyotis subflavus* was considered rare to uncommon in parts of Canada. Approximately 95% of the hibernating *Myotis* bats that have been counted occur in the range from Nova Scotia to Manitoba, with relatively few bats having been recorded west of Manitoba. However, the number in the north and west is considered an underestimate and the proportion of the populations of the two *Myotis* that has been affected by WNS since its arrival in Canada is unknown. During 2006-2012, an estimated 5.7-6.7 million bats in eastern North America died due to WNS. *M. lucifugus* is predicted to be functionally extirpated (i.e., <1% of former population) by 2026 in northeastern US. The same prediction likely applies to *M. septentrionalis* because of similar life history traits. *P. subflavus* populations have declined in the US by approximately 75%.

WNS has been recorded in Ontario, Quebec, NB, NS, and Prince Edward Island (PEI). Most population trend data are derived from counts in some of the few, known hibernacula. Data on *Myotis lucifugus* and *M. septentrionalis* often are combined but percent change is assumed to be equal between species. Declines recorded at hibernacula having pre- and post-WNS data have been catastrophic: 93% (Ontario); 99% (NB), 93% (NS) for *Myotis* combined, and 98% for *M. lucifugus* and 99.8% for *M. septentrionalis* in Quebec. The total decline in *Myotis* bats known to be present in NS, NB, Ontario, and Quebec hibernacula at time of WNS arrival, to most recent data for the same sites, is 94% (86,952 to 5,225). Relatively few *Perimyotis subflavus* occur in Canada and it is difficult to determine trends; declines of 94% and 75% were recorded in caves in Québec and NB, respectively. Trend data on bats in summer are limited but are similar to winter data, suggesting winter hibernacula data likely are an accurate reflection of declines in the population. Extent of Occurrence has not declined, and may not in the future if very low numbers persist across the species' ranges. Major population declines have not been reported outside of WNS range.

WNS was first recorded in Canada in spring 2010, and has spread in all directions from the epicentre in northern New York at a rate of 200-250 km/yr. There is uncertainty about the rate of spread to the western range of the two *Myotis* species. The amount of east-west bat movements, and the wintering ecology and hibernacula conditions that may affect the ecology of the disease in western and northern Canada are largely unknown. However, predictions that WNS will spread throughout the range of both species rest upon: 1) no evidence of containment to date; 2) evidence that abiotic conditions in western hibernacula are conducive to Pd growth; and 3) evidence that hibernacula with lower bat densities are still susceptible to WNS. Model predictions and present rate of spread suggest that WNS will reach the western edge of *M. lucifugus* range in 12-18 yrs, and western edge of *M. septentrionalis* in 12-15 yrs, or within three generations, which is 15-30 yrs. There are also concerns WNS may move more quickly to western Canada if transmitted via human clothing from infected caves. The Canadian range of *P. subflavus* already is contained within WNS range.

Rescue effect is not likely because mortality is high in adjacent areas of the US and any future immigrants likely will be vulnerable to Pd. A few sites near the epicentre have possibly stabilized at approximately 1,000 bats for several years (albeit following >90% decline), but it is unknown if these numbers indicate survival, or movement between hibernacula. There is the hope that some individuals have genetically-based resistance to WNS and they will survive and reproduce resistant offspring. However, the slow population growth rate of all three species means populations would take many generations to recover.

Threats and Limiting Factors

Other threats besides WNS include colony eradication, chemical contamination, change in forest structure, and wind turbines. Although cases of colony eradication have been documented (mainly chemical or physical destruction of maternity colonies of *Myotis lucifugus* in buildings), the overall number of colonies exterminated, or impacts on the larger-scale population is unknown. The extent of disturbance by people on hibernating bats and the impacts of chemical contamination on bats, or insecticide on prey availability are unknown. To date, the impact of wind turbines is highly variable among sites, but generally they have been less of a mortality factor on the three species than on other bat species that conduct long-distance migration. There is potential concern for *M. lucifugus* in some regions of Canada where higher mortality has been recorded.

Protection, Status, and Ranks

Regulations protecting bats vary across their range; removal of maternity colonies is permitted but some hibernacula are closed to the public. Ontario listed *M. lucifugus* and *M. septentrionalis* as Endangered, due to WNS, in autumn 2012. Both NB and NS listed all three species as Endangered in summer 2013.

COSEWIC Summaries – Three Bat Species

NatureServe ranks for *Perimyotis subflavus* are Global; G3 (vulnerable), National; N2N3, and S1 (critically imperilled) to S3 at the sub-national level. *Myotis lucifugus* (G3; N3) and *M. septentrionalis* (G1G3; N2N3) are ranked sub-nationally as apparently secure-secure (S4-S5) over much of their range, although jurisdictions within the area affected by WNS changed status to vulnerable or endangered in the last year, or are conducting a review because of WNS.