

Energy Production and Mining

The ‘energy production and mining’ category (IUCN 3) includes threats associated with exploring, developing and producing non-living resources. Within this category are threats associated with:

- Oil and gas drilling
- Mining and quarrying
- Renewable energy (geothermal, solar, wind, tidal)

Several related threats are described under other threat summaries, including the transportation of energy (Transportation and Service Corridors, IUCN 4), biomass harvest (Biological Resource Use, IUCN 5), dams associated with hydropower (Natural System Modification, IUCN 7), and pollutants released as a result of energy production and mining (Pollution, IUCN 9).

Risk Assessment Summary

Energy Production and Mining affects 10 habitats and 37 SGCN. The majority of threat assessment scores were ranked as low (n=38, 62%), followed by moderate (n = 22, 35%) and high (n = 2, 3%). Only the moderate and high ranking threats are summarized for each category in Table 4-15.

Risk assessments indicated that mining and quarrying, and renewable energy were the primary threats to habitats and species (Table 4E-1). Mining and quarrying was identified as a moderate threat to Appalachian oak pine forest, and talus slopes/rocky ridges. Bank swallow and Tri-colored Bat were both considered at high risk from mining and quarrying due to threats that were considered moderate in scope, but severe in their impacts on these species. Mining and quarrying was identified as a moderate threat to Big Brown Bat, Little Brown Bat, Fowlers toad, hognose snake, and northern black racer. Bat species are considered at risk from modification of mines including both mine closures and re-openings. Amphibians and reptiles are considered at risk from habitat conversion and mortality as a result of sand and gravel mining.

Wind energy development and production (both terrestrial and off-shore) was considered the principle threat from renewable energy production to wildlife. Habitat conversion and fragmentation effects on wildlife as a result of ridge top wind turbines were considered a moderate threat to talus slopes and rocky ridges, hemlock-hardwood-pine forest, high elevation spruce-fir forest and northern hardwood-conifer forest. Renewable energy ranked as a moderate threat for ten species of birds including Bicknell’s thrush, roseate tern, and three-toed woodpecker. Potential mortality from turbine impacts was considered a more significant threat to NH wildlife in the 2005 WAP compared to the 2015 revisions. The moderate risk posed by wind energy development and production resulted from habitat fragmentation and degradation rather than direct mortality associated with wind towers and turbines. Eastern Small-footed Bat changed from high to low risk due to a decreased likelihood that wind energy development will occur in areas affecting the species.

Mining and quarrying, and renewable (specifically wind) energy were considered the most significant threats to wildlife habitats in both the 2005 and 2015 risk assessments within this category. Two habitats: alpine, and caves and mines, changed from high to low risk when comparing the 2005 to the

current risk assessments. The change in threat to alpine habitat resulted from a decreased likelihood that wind energy development will occur in these areas. No habitats or species demonstrated an increased risk from low to high as a result of energy production and mining under the revisions to the 2005 Wildlife Action Plan.

Known Wildlife Exposure Pathways

Habitat loss and degradation due to mining and quarrying

Threats posed to NH wildlife by mining and quarrying fell in two categories: (i) alteration of mines with subsequent effects on bat species that use these habitats; and (ii) sand and gravel mining including both new mining activity and reclamation of existing mines.

Mines are used by bats in New Hampshire during both the summer and as winter hibernacula. Closure or reclamation of disused mines can lead to loss or degradation of this important bat habitat (Sherwin et al. 2009).

Sand and gravel mining in New Hampshire can serve as both a benefit and a risk to NH wildlife. However, assessments indicated that reclamation practices (i.e. the loss of anthropogenic habitat associated with sand and gravel extraction) represented a low risk to a limited number of bird species. Conversely, conversion of native habitat, particularly pine barrens and Appalachian oak pine forest, due to sand or gravel extraction represented a moderate threat to species and their habitats, i.e. the costs of sand and gravel mining were considered more significant than potential benefits.

Habitat loss, degradation and fragmentation due to inland wind energy development and production

Exposed locations such as ridges represent preferred sites for wind-energy development and production in New Hampshire. These same sites often represent unique and fragile habitats such as talus slopes and rocky ridges and high elevation spruce-fir forest. The development of wind farms results in a direct loss of these habitats through road and facility construction and maintenance, as well as fragmentation of remaining areas of habitat.

Habitat loss, degradation and direct mortality due to coastal and marine wind energy development and production

Coastal and offshore wind turbine facilities in NH are considered a moderate threat to piping plover. Although the likelihood of construction is low, the localized effect to the small population along our coast elevates the threat. Offshore wind farms can pose a risk of collision, short-term habitat loss during construction, long-term disturbance during turbine operation, barriers to migration, and loss of feeding sites (Exo et al. 2003, Hüppop et al. 2006). However, the risk of mortality due to collision may be low for birds flying within the vicinity of the wind farm (Desholm and Kahlert 2005). The first offshore wind project in North America has begun construction near Block Island, RI, and several other major projects have been proposed off the northeast coast of the United States.

Direct mortality due to wind-energy production

An estimated 234,000 birds are killed annually from collisions with wind turbines in the conterminous United States (Loss et al. 2013). Certain species of birds including small songbirds and some species of

raptor are more prone to mortality than others (Drewitt and Langston 2006, Loss et al. 2013). When considering declines in abundance (rather than reported mortality), ducks appear to experience the most pronounced declines followed by waders, raptors, and songbirds (Stewart et al. 2005). Mortality of bats is often substantially higher than that of birds (American Wind Wildlife Institute 2014). In 2014, New Hampshire had 70 utility-scale wind turbines generating ~2.1% of the in-state energy production (<http://www.awea.org/resources/>).

Research Needs

- More information is needed on the direct threats (habitat loss and mortality) associated with current and proposed wind energy projects in the Northeast and New Hampshire. This should include a minimum of three years to fully document impacts to wildlife (USFWS recommendation).
- More information relating to the spatial extent of conversion of Appalachian oak pine forest to barren lands as a result of sand and gravel extraction is needed.
- A statewide survey of optimal locations for wind energy generation, important wildlife habitat, SGCN species occurrence, and existing protected areas to support decision-making around wind-energy siting.

Table 4-15. Habitats and species at highest risk from the effects of energy production & mining (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 further details on specific threats and rankings.

Habitat	IUCN Level 2	Overall Threat Score
Appalachian Oak Pine Forest	Mining & quarrying	M
Hemlock-Hardwood-Pine Forest	Renewable energy	M
High Elevation Spruce-Fir Forest	Renewable energy	M
Northern Hardwood-Conifer Forest	Renewable energy	M
Talus Slopes, Rocky Ridges	Mining & quarrying	M
Talus Slopes, Rocky Ridges	Renewable energy	M

Common Name	IUCN Level 2	Overall Threat Score
Bank Swallow	Mining & quarrying	H
Bicknell's Thrush	Renewable energy	M
Big Brown Bat	Mining & quarrying	M
Canada Warbler	Renewable energy	M
Common Tern	Renewable energy	M
Fowlers Toad	Mining & quarrying	M
Hognose Snake	Mining & quarrying	M

Little Brown Bat	Mining & quarrying	M
Northern black racer	Mining & quarrying	M
Northern myotis (Northern Long-eared Bat)	Mining & quarrying	M
Piping Plover	Renewable energy	M
Purple Finch	Renewable energy	M
Roseate Tern	Renewable energy	M
Scarlet Tanager	Renewable energy	M
Three-toed Woodpecker	Renewable energy	M
Tri-colored Bat	Mining & quarrying	H
Veery	Renewable energy	M
Wood Thrush	Renewable energy	M

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