DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R5–ES–2012–0056]

[4500030113]

Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition to List the Bicknell's Thrush (*Catharus bicknelli*) as Endangered or Threatened

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of petition finding and initiation of status review.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 90-day finding on a petition to list the Bicknell's thrush (*Catharus bicknelli*) as endangered or threatened under the Endangered Species Act of 1973, as amended (Act), and to designate critical habitat. Based on our review, we find that the petition presents substantial scientific or commercial information indicating that listing this species may be

warranted. Therefore, with the publication of this notice, we will be initiating a review of the status of the species to determine if listing the Bicknell's thrush is warranted. To ensure that our status review is comprehensive, we are requesting scientific and commercial data and other information regarding this species. Based on the results of our status review, we will issue a 12-month finding on the petition, which will address whether the petitioned action is warranted, as provided in section 4(b)(3)(B) of the Act.

DATES: We request that we receive information on or before **[**INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**]**. The deadline for submitting an electronic comment using the Federal eRulemaking Portal (see **ADDRESSES** section below) is 11:59 p.m. Eastern Time on this date. After **[**INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**]**, you must submit information directly to the **Division of Policy and Directives Management** (see **ADDRESSES** section below). Please note that we might not be able to address or incorporate information that we receive after the above requested date.

ADDRESSES: You may submit information by one of the following methods:

(1) *Electronically*: Go to the Federal eRulemaking Portal: *http://www.regulations.gov*. In the Search field, enter FWS–R5–ES–2012–0056, which is the docket number for this action. Then click on the Search button. You may submit a comment by clicking on "Comment Now!." If your submission will fit in the provided comment box, please use this feature of *http://www.regulations.gov*, as it is most compatible with our information collection procedures. If you attach your submission as

a separate document, our preferred file format is Microsoft Word. If you attach multiple documents (such as form letters), our preferred format is a spreadsheet in Microsoft Excel.

(2) *By hard copy*: Submit by U.S. mail or hand-delivery to: Public Comments Processing, Attn: FWS–R5–ES–2012–0056; Division of Policy and Directives Management; U.S. Fish and Wildlife Service; 4401 N. Fairfax Drive, MS 2042–PDM; Arlington, VA 22203.

This finding is available on the Internet at *http://www.regulations.gov* at Docket Number FWS–R5–ES–2012–0056. Supporting documentation we used in preparing this finding is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, New England Field Office, 70 Commercial Street, Suite 300, Concord, New Hampshire 03301.

We will post all information we receive on *http://www.regulations.gov*. This generally means that we will post any personal information you provide us (see the **Request for Information** section below for more details).

FOR FURTHER INFORMATION CONTACT: Thomas R. Chapman, Supervisor, U.S. Fish and Wildlife Service, New England Field Office, 70 Commercial Street, Suite 300, Concord, New Hampshire 03301; by telephone at 603-223-2541. If you use a telecommunications device for the deaf (TDD), please call the Federal Information Relay

Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Request for Information

When we make a finding that a petition presents substantial information indicating that listing a species may be warranted, we are required to promptly initiate review of the status of the species (status review). For the status review to be complete, and based on the best available scientific and commercial information, we request information on the Bicknell's thrush from governmental agencies, Native American tribes, the scientific community, industry, and any other interested parties. We seek information on:

(1) The species' biology, range, and population trends, including:

(a) habitat requirements for feeding, breeding, and sheltering;

(b) genetics and taxonomy;

(c) historical and current range, including distribution patterns;

(d) historical and current population levels, and current and projected trends; and

(e) past and ongoing conservation measures for the species, its habitat, or both.

(2) The factors that are the basis for making a listing determination for a species

under section 4(a) of the Act (16 U.S.C. 1531 *et seq*.), which are:

(a) The present or threatened destruction, modification, or curtailment of its habitat or range;

(b) overutilization for commercial, recreational, scientific, or educational purposes;

(c) disease or predation;

(d) the inadequacy of existing regulatory mechanisms; or

(e) other natural or manmade factors affecting its continued existence.

(3) Information regarding the potential impacts to the species resulting from climate change, such as data, analyses, and predictions related to:

(a) The loss of spruce-fir forested habitat where the species breeds, including the projected impacts to the Canadian portion of the species' breeding range;

(b) impacts to forest habitats in the Caribbean that provide important wintering habitat for the species; and

(c) alterations to the cycling and productivity in balsam fir cone production that may alter population dynamics in red squirrels, a major predator of nestling Bicknell's thrush.

(4) Information regarding the ongoing and projected impacts of ground-level ozone emissions on spruce and fir in the northeastern United States and Maritime

Provinces of Canada.

(5) Behavioral, survival, and reproductive consequences of various mercury accumulation levels in insectivorous songbirds.

(6) Impacts to the species resulting from the construction and operation of commercial wind turbines and transmission lines in breeding habitat, including habitat loss, mortality, productivity, and avoidance of turbines as a result of blade movements or noise.

(7) Existing regulatory mechanisms that may be protective of the Bicknell's thrush and its habitat, particularly on its wintering grounds in the Greater Antilles.

If, after the status review, we determine that listing the Bicknell's thrush is warranted, we will propose critical habitat (see definition in section 3(5)(A) of the Act) under section 4 of the Act, to the maximum extent prudent and determinable at the time we propose to list the species. Therefore, we also request data and information on:

(1) What may constitute "physical or biological features essential to the conservation of the species," within the geographical range currently occupied by the species;

(2) where these features are currently found;

(3) whether any of these features may require special management considerations

or protection;

(4) specific areas outside the geographical area currently occupied by the species that are "essential for the conservation of the species"; and

(5) what, if any, critical habitat you think we should propose for designation if the species is proposed for listing, and why such habitat meets the requirements of section 4 of the Act.

Please include sufficient information with your submission (such as scientific journal articles or other publications) to allow us to verify any scientific or commercial information you include.

Submissions merely stating support for or opposition to the action under consideration without providing supporting information, although noted, will not be considered in making a determination. Section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or threatened species must be made "solely on the basis of the best scientific and commercial data available."

You may submit your information concerning this status review by one of the methods listed in the **ADDRESSES** section. If you submit information via *http://www.regulations.gov*, your entire submission—including any personal identifying information—will be posted on the website. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this personal identifying information from public review.

However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on *http://www.regulations.gov*.

Information and supporting documentation that we received and used in preparing this finding is available for you to review at *http://www.regulations.gov*, or by appointment, during normal business hours, at the U.S. Fish and Wildlife Service, New England Field Office **(**see **FOR FURTHER INFORMATION CONTACT)**.

Background

Section 4(b)(3)(A) of the Act requires that we make a finding on whether a petition to list, delist, or reclassify a species presents substantial scientific or commercial information indicating that the petitioned action may be warranted. We are to base this finding on information provided in the petition, supporting information submitted with the petition, and information otherwise available in our files. To the maximum extent practicable, we are to make this finding within 90 days of our receipt of the petition and publish our notice of the finding promptly in the **Federal Register**.

Our standard for substantial scientific or commercial information within the Code of Federal Regulations (CFR) with regard to a 90-day petition finding is "that amount of information that would lead a reasonable person to believe that the measure proposed in the petition may be warranted" (50 CFR 424.14(b)). If we find that substantial scientific or commercial information was presented, we are required to promptly initiate a species

status review. The status review and 12-month petition finding are combined in a single **Federal Register** notice.

Petition History

On August 26, 2010, we received a petition, dated August 24, 2010, from Mollie Matteson, Center for Biological Diversity (CBD or petitioner), Northeast Field Office, requesting that the Bicknell's thrush be listed as threatened or endangered and that critical habitat be designated under the Act. The petition clearly identified itself as such and included the requisite identification information for the petitioner, required at 50 CFR 424.14(a). In a September 9, 2010, letter to the petitioner, we responded that we would review the information presented in the petition and determine if listing of the Bicknell's thrush was warranted. This finding addresses the petition.

Previous Federal Actions

In 1994, the Bicknell's thrush was determined to be a category 2 species of concern and we announced that finding in the Animal Candidate Review for Listing as Endangered or Threatened Species (59 FR 58982). Category 2 was defined as including taxa for which the Service had information indicating that proposing to list as endangered or threatened is possibly appropriate, but for which persuasive data on biological vulnerability and threat are not currently available to support proposed rules. In 1996, the

Service discontinued the list of category 2 candidate species, resulting in the removal of the Bicknell's thrush from candidate status (61 FR 64481).

Although the Bicknell's thrush was removed from the list of candidate species in 1996, the species was identified by the North American Bird Conservation Initiative as one of the Highest Priority Landbirds in the Atlantic Northern Forest (Dettmers 2006, p. 21), and the Service's New England Field Office has continued to amass information related to the species and to support conservation of the species.

On September 9, 2011, the U.S. District Court for the District of Columbia approved two settlement agreements: one agreement between the Service and CBD and a second agreement between the Service and WildEarth Guardians (WEG). The agreements enable the Service to systematically, over a period of 6 years, review and address the needs of more than 250 species listed on the 2010 Candidate Notice of Review (75 FR 69222). The agreements also include additional scheduling commitments for a small subset of the actions in the 6-year work plan that are consistent with the Service's objectives and biological priorities. For the Bicknell's thrush, the settlement agreement with WEG specifies that we will complete a 90-day petition finding by the end of fiscal year 2012.

Species Information

The Bicknell's thrush (*Catharus bicknelli*) is the smallest of North American *Catharus* thrushes in the family Turdidae, which includes all birds related to the robins (Rimmer *et al*. 2001, p. 2). Rimmer *et al*. (2001, pp. 1–28) provides a comprehensive overview of the species' biology. Field identification of the Bicknell's thrush is difficult, because of close similarities in appearance with the gray-cheeked (*C. minimus*) and the Swainson's (*C. ustulatus*) thrushes (Wallace 1939, p. 217; Rimmer *et al*. 2001, p. 2). The total population of Bicknell's thrush is estimated to be 95,000 to 126,000 birds (International Bicknell's Thrush Conservation Group (IBTCG) 2010, p. 6).

The Bicknell's thrush was considered a subspecies of the gray-cheeked thrush until 1993. Ornithologists carefully evaluated the species' morphology, range, song, behavior, habitat, and genetic divergences and detected significant differences between the taxa. This evaluation subsequently led to the recommendation that the Bicknell's thrush be elevated to a full species (Ouellet 1993, p. 568). The American Ornithologist Union (1995, p. 824) recognizes the Bicknell's thrush as a species, and the Service concurs with that taxonomic change.

The Bicknell's thrush is a migratory species, meaning it travels between different geographical areas to fulfill life-history functions like breeding and raising its young. The species feeds predominantly on insects, but during migration and on its wintering grounds, the species can shift its diet almost entirely to the consumption of several varieties of small fruits (Beal 1915 in Wallace 1939, p. 295; Rimmer *et al*. 2001, pp. 9–10; Townsend *et al*. 2010, p. 517). Bicknell's thrush forages for food among trees,

feeding among the branches or hawking (pursuit in flight); however, most foraging activity takes place on or near the ground through litter pecking or gleaning (Wallace 1939, p. 295; Sabo 1980, p. 251; Rimmer *et al*. 2001, pp. 9–10).

The Bicknell's thrush breeds in portions of the northeastern United States and eastern and southern Canada and winters in the Greater Antilles. On its way between the breeding and wintering grounds, the Bicknell's thrush flies along the Atlantic coast and may stop in certain areas for resting and feeding. The breeding range of the species extends from the northern Saint Lawrence area of Quebec and the Maritime Canadian Provinces south through New England and New York to that State's Catskill Mountains (Wallace 1939, pp. 258–259; Ouellet 1993, pp. 563–564; Rimmer *et al*. 2001, p. 1). Breeding habitat for the Bicknell's thrush is described as dense tangles of both living and dead "stunted" trees that are predominately balsam fir (*Abies balsamea*) with lesser amounts of red spruce (*Picea rubens*) and white birch (*Betula papyrifera var. cordifolia*) (Wallace 1939, p. 285; Rimmer *et al*. 2001, p. 7; Ouellet 1993, p. 561). Depending upon location, white spruce (*P. glauca*) or an occasional black spruce (*P. mariana*) can also provide breeding habitat, as can pin cherry (*Prunus pennsylvanica*), mountain ash (*Sorbus americanus*), shadbush (*Amelanchier spp*.), and other deciduous species (Wallace 1939, pp. 285–286; Sabo 1980, p. 242; Ouellet 1993, p. 561; Rimmer *et al*. 2001, p. 7). Except in the case of the Maritime Provinces, where the species can be found at lower elevations using regenerating industrial forests, the species breeds mostly in stunted high elevation, or montane spruce-fir forests located close to, but below, timberline, which usually occurs at elevations in excess of 900 meters (m) (3,000 feet

(ft)) elevation (Wallace 1939, pp. 248 and 286; Ouellet 1993, pp. 560, 561; Atwood *et al*. 1996, p. 652; Rimmer *et al*. 2001, p. 7).

The montane spruce-fir forests that this species prefers for breeding are typical of chronically disturbed areas associated with altered growing conditions resulting from human activities (e.g., ski trails) and natural processes. Natural disturbances include 'terrific' winds, which can exceed 45 meters per second (mps) (100 miles per hour (mph)), and heavy rime ice accumulation that occurs when supercooled water droplets undergo rapid freezing upon contact with a cold surface (Wallace 1939, p. 282; Rimmer *et al*. 2001, p. 7). As a result of these conditions, trees are stunted and the mean canopy height in areas where the Bicknell's thrush is found in the White Mountains of New Hampshire is 4.8 m (15.7 ft) (Sabo 1980, p. 250). Habitats of this type provide approximately 100,000 to 150,000 hectares (ha) (247,105 to 370,658 acres (ac)) of Bicknell's thrush nesting habitat for the United States' breeding population, which is estimated to be between 57,000 and 77,000 birds and represents approximately 60 percent of the global population (Atwood *et al*. 1996, p. 654; IBTCG 2010, p. 6).

The remaining global population of the Bicknell's thrush, or 37,000 to 49,000 birds, breeds in Canada (IBTCG 2010, p. 6). While Bicknell's thrush can be found in Canadian habitats associated with industrial forests at elevations as low as 175 m (574 ft), most are found in montane spruce-fir forests at elevations exceeding 600 m (1968 ft) (Ouellet 1993, pp. 560–563; Nixon *et al*. 2001, p. 38). Bird densities in lower elevation habitats range from 16 to 40 pairs per 100 ha (247 ac), which is much lower than the 90

to 100 pairs per 100 ha (247 ac) densities measured during a 4-year study in montane habitat on Vermont's Mount Mansfield (Nixon *et al*. 2001, p. 38; Rimmer *et al*. 1996, p. 641).

Although the Bicknell's thrush exhibits some flexibility in the elevation of breeding habitats used, the species demonstrates a strong preference for a specific vegetation structure. Breeding habitats in montane habitats or in lower elevation areas are characterized by dense vegetation (Rimmer *et al*. 2001, pp. 7–8).

Breeding occurs in June, with males singing to attract a mate (Wallace 1939, p. 311; Rimmer *et al*. 2001, p. 12). Both males and females will mate with multiple partners, resulting in multiple paternity within the same nest (Rimmer *et al*. 2001, p. 13). Nest building and egg incubation is the sole responsibility of the female, but both males and females feed the chicks (Wallace 1939, pp. 323–325; Rimmer *et al*. 2001, pp. 15–17). Fledging occurs at 9 to 14 days, at which time the young either stay in the vicinity of the nest or depart to other areas, including down-slope, hardwood-dominated habitats (Rimmer *et al*. 2001, p. 18). The sex ratio of Bicknell's thrush nestlings can vary from 1 male:1.5 females to 2 males:1 female (Rimmer *et al*. 2001, p. 13; Townsend *et al*. 2009, pp. 92–93).

By the end of September, the Bicknell's thrush departs its breeding grounds (Wallace 1939, p. 259). Migration patterns are poorly known (Ouellet 1993, p. 564; Rimmer *et al*. 2001, pp. 6–7); however, fall migration progresses at a "leisurely" pace

with most birds usually remaining at some stop-over locations for a day or two and some documented to stay for as long as 7 days (Wallace 1939, p. 259; Rimmer *et al*. 2001, p. 7). Fall migration follows a coastal route, south to the mid-Atlantic coast where it is thought that most birds depart land and fly across the ocean, finally arriving in the Greater Antilles by early November (Ouellet 1993, p. 564; Rimmer *et al*. 2001, pp. 6–7).

Wintering occurs exclusively in the Greater Antilles, with the majority of birds on the island of Hispaniola, in Haiti and the Dominican Republic. The species can also be found on the islands of Cuba, Jamaica, and Puerto Rico (Rimmer *et al*. 2001, pp. 3–4), although it is considered an uncommon migrant in Hispaniola; a rare migrant to the Bahamas, Cuba, and Jamaica; and a vagrant on Puerto Rico and the Virgin Islands (Raffaele *et al*. 1998, p. 376). In the Dominican Republic, the Bicknell's thrush can be found from sea level to 2,200 m (7,200 ft), although most occur in mesic to wet broadleaf montane forests in excess of 1,000 m (3,300 ft) elevation (Rimmer *et al*. 2001, p. 8). The Bicknell's thrush can also be found in dry, pine-dominated forests (Rimmer *et al*. 2001, p. 6). The species prefers dense thicket vegetation similar to habitats selected during the breeding season (Townsend *et al*. 2010, p. 520), and individuals (both males and females) defend and maintain exclusive territories where conspecifics (members of the same species) are excluded (Townsend *et al*. 2010, p. 517).

In spring, the birds leave the Greater Antilles, probably by late April (Rimmer *et al*. 2001, p. 5). They first appear in Florida, and by the end of May they can be found

back in the mountains of New England and Canada (Wallace 1939, p. 259; Rimmer *et al*. 2001, p. 5). Males typically arrive sooner than the females (Rimmer *et al*. 2001, p. 5).

Population Trends

Conducting comprehensive surveys for the Bicknell's thrush is difficult because of the species' patchy distribution. As a result, Bicknell's thrush is under-represented in the United States' historical Breeding Bird Survey data, making detection of long-term trends difficult (Bystrak 1981, p. 38). However, several local extirpations from former breeding habitat have been detected (Rimmer *et al*. 2001, p. 4). For example, in Massachusetts, the Bicknell's thrush breeding population on Mount Greylock gradually declined from 10 pairs in 1950 to 0 pairs in 1973, and visits to Saddle Ball Mountain during the period 1992 to 1995 failed to detect the species (Atwood *et al*. 1996, p. 657). This same survey also failed to detect the Bicknell's thrush where it had historically occurred in Vermont on Glebe and Molly Stark Mountains, as well as Mounts Aeolus and Ascutney. In New Hampshire, Bicknell's thrush was not found on Mounts Pemigewasset, Monadnock, and Sunapee, as well as North Moat Mountain, where the species had been previously located.

In Canada, the species has disappeared from Seal and Mud Islands in Nova Scotia (Committee on the Status of Endangered Wildlife in Canada (COSEWIC) 2009, p. 9), despite being relatively common at the time of Wallace's writing (1939, p. 331), when at least a dozen nests were found on Seal Island. Bicknell's thrush has also been absent

from formerly occupied habitats on Cape Breton Island and Cape Forchu, Nova Scotia (COSEWIC 2009, p. 9; Rimmer *et al*. 2001, p. 4). In Quebec, the Bicknell's thrush has not been observed in the last 10 years in the following previously occupied locations: Montagne Noire; Monts Sir-Wilfrid, des Éboulements, Comi, and St-Pierre; at some previously occupied sites in the zec des Martres; Métis-sur-Mer; and on Bonaventure and Magdalen Islands (COSEWIC 2009, p. 9). In New Brunswick since the 1980s, the species has apparently become absent as a breeder from the southern half of the province, including from Grand Manan Island and the Rapidy Brook area (COSEWIC 2009, p. 9).

To obtain better information on the population status of all birds occupying high-elevation spruce-fir habitat in New Hampshire's White Mountains, a comprehensive survey was conducted during the period of 1993 to 2003 (King *et al*. 2008). This survey effort involved annual bird counts at 768 points on 42 transects located along hiking trails. The results revealed that in a 10-year period (1993 to 2003), the Bicknell's thrush population had declined by 7 percent (Lambert *et al*. 2008, p. 607) in the survey area. However, results from this study may not be indicative of Bicknell thrush populations rangewide, especially when considering that the combined trend data from across the United States' breeding range have been stable for the period 2001 to 2009, with local abundance increasing in the Adirondack Mountains (New York), while remaining the same in the Catskills (New York), the Green Mountains (Vermont), and the White Mountains (New Hampshire) (IBTCG 2010, p. 7). Conversely, survey data from Canada demonstrate a 17 percent annual decline in New Brunswick and a 15 percent annual decline in Nova Scotia (IBTCG 2010, p. 7). On Mont Gosford, there were 60 percent

fewer individuals detected in 2007 than in 2001 (IBTCG 2010, p. 7). Long-term Canadian Breeding Bird Survey data for the period of 1966 to 2008 show a 9 percent decline (IBTCG 2010, p. 7).

In summary, the readily available current population trend information seems to indicate a static or slightly declining Bicknell's thrush breeding population from historical population levels. However, there is no information readily available to the Service about the species' wintering population. Further information about the species' overall population numbers and trends will be gathered during the status review.

Evaluation of Information for this Finding

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations at 50 CFR 424 set forth the procedures for adding a species to, or removing a species from, the Federal Lists of Endangered and Threatened Wildlife and Plants. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

In considering what factors might constitute threats, we must look beyond the mere exposure of the species to the factor to determine whether the species responds to the factor in a way that causes actual impacts to the species. If there is exposure to a factor, but no response, or only a positive response, that factor is not a threat. If there is exposure and the species responds negatively, the factor may be a threat, and we then attempt to determine how significant a threat it is. If the threat is significant, it may drive or contribute to the risk of extinction of the species such that the species may warrant listing as threatened or endangered as those terms are defined by the Act. This does not necessarily require empirical proof of a threat. The combination of exposure and some corroborating evidence of how the species is likely impacted could suffice. The mere identification of factors that could impact a species negatively may not be sufficient to compel a finding that listing may be warranted. The information shall contain evidence sufficient to suggest that these factors may be operative threats that act on the species to the point that the species may meet the definition of threatened or endangered under the Act.

In making this 90-day finding, we evaluated whether information regarding threats to the Bicknell's thrush, as presented in the petition and other information available in our files, is substantial, thereby indicating that the petitioned action may be warranted. Our evaluation of this information is presented below.

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range.

Information Provided in the Petition

The petitioner asserts that the "primary threat to the long-term persistence of the Bicknell's thrush is habitat loss" (Center for Biological Diversity 2010 petition (Petition), p. 24). The petitioner concludes that "montane ecosystems that host populations of the Bicknell's thrush are small and fragmented, heightening their vulnerability to a number of complex, interrelated threats" (Petition, p. 24). "Foremost among these threats is global climate change," the petitioner asserts, that will result in disappearance of montane forests from the species' current breeding range (Petition, p. 24). In addition to direct and indirect impacts of climate change, the petition also describes other factors that contribute to the loss of important breeding and wintering Bicknell's thrush habitat, including: (1) acid rain deposition; (2) ground-level ozone and nitrogen atmospheric deposition; (3) recreational, telecommunication, and wind energy development activities; and (4) timber extraction that results in the conversion of breeding habitat to other land uses (Petition, pp. 6, 24).

Evaluation of Information Provided in the Petition and Available in Service Files

Climate Change — Impacts to Breeding and Wintering Habitat

The petitioner states that "Climate change represents the gravest threat to the long-term survival of the Bicknell's thrush" (Petition, p. 24). The petition provides an overview of global climate change research, including past, present, and predicted future climate change conditions (Petition, pp. 24–28). Following this overview of the scientific basis of global climate change, the petitioner discusses observed and predicted impacts to Bicknell's thrush habitat. The petitioner asserts that the predicted global climate change will result in increased July temperatures that could lead to a reduction in the amount of spruce-fir habitat for the Bicknell's thrush by over 95 percent (Petition, p. 29), as well as increase the frequency of erratic and severe weather events. The petition also cites references that indicate that climate change will result in drying trends for the Caribbean Basin that may reduce the suitability of important wintering habitats, as well as an increase in the frequency of tropical storms that may destroy habitat (Petition, pp. 31, 33).

Regarding climate change-induced increased summer temperatures in the Northeast, several studies provide relevant information. For example, the petitioner asserts that the Fourth Assessment Report: Climate Change 2007 (hereafter referred to as AR4), prepared by the Intergovernmental Panel on Climate Change (IPCC) presents the best available science on global climate change. We concur that the information on global climate change contained within AR4 is reliable. The IPCC concludes that warming of the climate system is unequivocal, as is now evident from observations of increase in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level (IPCC 2007, p. 2). Further, they attribute the

warming to a 70 percent increase in greenhouse gas (mostly CO_2) emissions from human activities during the period 1970 to 2004, and those emissions result in a marked increase in global concentration of contributing gases, as evidenced by ice core samples (IPCC 2007, p. 5). In conclusion, the IPCC expresses a "very high confidence" that the net effect of recent human activities has been one of warming (IPCC, p. 5).

This warming trend is expected to continue as a result of a projected increase of global greenhouse gas emissions by 25 to 90 percent between 2000 and 2030, which would be greater than the change observed during the 20th century (IPCC, p. 7). Although there is some uncertainty regarding the mechanics of climate change and how much temperatures will change, the projected global average surface temperature increase is estimated to range from 1.1 ^{o}C to 6.4 ^{o}C (2.0 °F and 11.5 ^{o}F) in 2090 to 2099, over the temperatures observed during the 19-year period of 1980 to 1999 (IPCC 2007, p. 8). Consistent with this increase in global average temperatures, at a regional scale, average annual temperatures in the northeastern United States are also projected to rise by 2.9 ^{o}C to 5.3 ^{o}C (5.0 °F to 10.0 ^{o}F) by 2070 to 2099, in comparison to the period of 1961 to 1990 (Hayhoe *et al.* 2007, p. 388).

The petition presents research, supported by readily available information in our files, which demonstrates that climate change-induced habitat loss has occurred within the range of the Bicknell's thrush. The spruce-fir/deciduous ecotone is correlated with elevation areas that have a mean July temperature of approximately 17 ^{o}C (63 °F); consequently, montane spruce-fir forests are restricted to upper elevations (Cogbill and

White 1991, pp. 169 and 171). During the period of 1964 to 2004, analysis of forest plots in Vermont's Green Mountains indicates a 19 percent increase in the dominance of northern hardwood species in the northern hardwood-boreal forest ecotone, at the expense of red spruce, balsam fir, and montane paper birch (Beckage *et al.* 2008, p. 4197). This tree species shift is corroborated by remotely sensed data from 1962 to 2005 that indicates a 92-m (302-ft) and 119-m (390-ft) upslope movement in the northern hardwood to boreal ecotone on two mountains: Mount Abraham, which supports a breeding population of the Bicknell's thrush (Rimmer *et al.* 2005a, p. 27) and Camels Hump. This change coincides with an increase of 1.1 ^{o}C (2 °F) in annual temperature during the same period, and the authors propose that this climate change promotes the growth and recruitment of northern hardwoods at higher elevations (Beckage *et al.* 2008, p. 4201). The authors then suggest that the increase in northern hardwood species is made possible by vacancies left by boreal forest species that have, possibly, succumbed to the effects of acid rain depositions, to which red spruce mortality has been attributed (Beckage *et al.* 2008, p. 4201). In conclusion, the authors suggest "that high-elevation forests may be jeopardized by climate change…" (Beckage *et al*. 2008, p. 4197). Similar information also exists from other Vermont sites (Friedland 1989, pp. 240–241) and from New York (Cook 1985 and Johnston *et al.* 1988 in Friedland 1989, p. 242).

The montane spruce-fir forests of New York and northern New England provide breeding habitat for approximately 60 percent of the world's estimated Bicknell's thrush population (IBTCG 2010, p. 6). Rodenhouse *et al.* (2008, p. 525) suggest that because the occurrence of this habitat type is primarily controlled by climate, projected warming

has the potential to alter the distribution and abundance of the Bicknell's thrush. To evaluate the consequences of climate change to Bicknell's thrush habitat, Rodenhouse *et al.* (2008, p. 525) evaluate the potential impacts of a warming climate on modeled Bicknell's thrush habitat. The authors argue a warming climate will enable northern hardwoods to encroach on red spruce and balsam fir, causing the montane spruce fir forest to shift out of Bicknell's thrush habitat suitability (Rodenhouse *et al.* 2008, p. 525). Based on their results, regional warming of 1 ^{o}C (1.8 °F) will reduce Bicknell's thrush habitat by more than one half, while an increase of 2 ^{o}C (3.6 °F) may result in the elimination of all breeding sites from the Catskill Mountains and most of Vermont. Furthermore, with an increase of 3 ^{o}C (5.4 °F), most Bicknell's thrush will be eliminated from the northeastern United States. With an increase of 5 ^{o}C (9 °F), nearly all the habitat will be eliminated, but some small habitat patches may persist (Rodenhouse *et al.* 2008, p. 526). This information is relevant, because the average annual temperatures in the northeastern United States are projected to rise by 2.9 ^{o}C to 5.3 ^{o}C (5.0 °F to 10.0 ^{o}F) by 2070 to 2099, above those of the period 1961 to 1990 (Hayhoe *et al.* 2007, p. 388).

The petitioner indicates that she is unaware of any climate modeling for Canadian highland forests used by Bicknell's thrush (Petition, p. 31). This will be further investigated during our 12-month status review.

In regard to increasing frequency of storms, the petitioner also indicates that climate change will cause "more erratic and severe weather events" but acknowledges that how or to what extent the bird's breeding habitat will be impacted is unknown

(Petition, p. 33). There is no information readily available to the Service specific to the expected frequency or intensity of storms that may impact montane spruce-fir breeding habitat, but this will be further investigated during our 12-month status review.

In addition to climate change impacts to breeding habitat, the petitioner asserts that the quality of wintering habitat for the Bicknell's thrush in the Greater Antilles will be reduced by climate change-induced drought (Petition, p. 31) and more intense and frequent El Niño Southern Oscillation events (Petition, p. 33). By 2050, the observed significant drying trends in the Caribbean are expected to reduce water resources (Neelin *et al.* 2006, p. 6110; IPCC 2007, p. 52). The impacts of these drought conditions or flooding that may result from El Niño events on the Bicknell's thrush and its habitat are unclear. There is no information readily available to the Service on climate change in this area, but this will be further investigated during our 12-month status review.

Climate Change — Changing Dynamic of Forest Pests and Disease

The petition suggests that climate change may alter the disturbance dynamics of native forest insects and diseases, as well as facilitate the establishment and spread of nonindigenous species (Hunt *et al.* 2006, pp. 6–7). In addition to the direct degradation of breeding habitat, these pests may facilitate invasion of montane spruce-fir forests by northern hardwoods (Beckage *et al.* 2008, p. 4201), as discussed below.

The spruce budworm (*Choristoneura fumiferana*) is the most important native

pest of spruce and fir in the Northeast and is capable of substantially modifying large areas of boreal forest (Fleming and Candau 1998, p. 236). The spruce budworm is a naturally outbreaking insect that can be extremely abundant for periods of 5 to 15 years, with populations reaching 10^8 fourth instar larvae per ha (> 40 million per ac). This level of abundance can kill most trees in dense, mature balsam fir stands (Fleming and Candau 1998, pp. 236, 237; Gitay *et al.* 2001, p. 291). These periods of abundance can be followed by periods of up to 60 years when the budworm is relatively rare. Budworm outbreaks frequently follow droughts or hot, dry summers. This event sequencing may lead to increased egg production and disruptions in the timing of budworm and several of its parasitoid predators, thereby increasing population growth potential in the budworm (Gitay *et al.* 2001, p. 291). Therefore, the environmental changes resulting from climate change could affect spruce budworm populations by altering any of the relationships among host tree species, the budworm, and its natural enemies (Fleming and Candau 1998, p. 236).

Local extinction of balsam fir is one potential outcome of climate change-induced intensification of spruce budworm outbreaks (Fleming and Candau 1998, p. 246). However, a potential benefit of this change is that the Bicknell's thrush is known to use regenerating forests disturbed by spruce budworm infestations (COSEWIC 2009, p. 10; Bredin and Whittam 2009, p. 13). As we describe above in the Species Information section, Bicknell's thrush feed on many insects, including species of lepidopteran larvae (Wallace 1939, p. 295), which may include the spruce budworm.

The balsam woolly adelgid (*Adelges piceae*) is another insect that the petitioner discusses as a threat to Bicknell's thrush habitat. The balsam woolly adelgid is an exotic pest of fir trees, introduced from central Europe, and is impacting large stands of fir in the southern Appalachians (Iverson *et al.* 1999, p. 176; Ragenovich and Mitchell 2006). Weather is an important factor in the survival of this insect, because in cold winters, only those adelgids below the snowline will survive temperatures below -1 ^{o}C (30 ^{o}F) (Ragenovich and Mitchell 2006, p. 9). Furthermore, only the first instar can survive the winter. In montane spruce-fir habitats, the season may be too short for this insect to complete a second generation, which affords some protection to high elevation Bicknell's thrush breeding habitat (Ragenovich and Mitchell 2006, p. 9). There is the potential, however, for the balsam woolly adelgid to have deleterious effects on the Bicknell's thrush breeding habitat quality (Lambert *et al.* 2005, p. 7; IBTCG 2010, p. 14) if overall temperatures rise as modeled by the IPCC.

Summary of Climate Change — Results of the empirical studies we discuss above suggest that breeding habitat within the United States, and possibly in Canada, may decrease with a warming climate. Although the impacts of a warming climate on the species' wintering range have not been quantified, habitat modeling indicates that continued warming may lead to the complete loss of the species' breeding habitat within the United States by the end of the 21st century. In addition, the predicted warming trends may result in more favorable conditions for forest pests such as the spruce budworm and balsam woolly adelgid. Therefore, information presented in the petition and readily available in our files indicates that environmental impacts associated with

climate change may be a threat to the Bicknell's thrush.

Atmospheric Acid and Nitrogen Deposition and Ground-Level Ozone

The petition asserts that deposition of acid and nitrogen poses a serious threat to Bicknell's thrush habitat throughout its high-elevation habitat (Petition 2010, pp. 33–36). Acid deposition, commonly referred to as acid rain, is mostly derived from the burning of fossil fuels, such as coal and gas, that results in the production of sulfur dioxide and nitrogen oxides that in turn react with atmospheric water, oxygen, and other chemicals to form various acidic compounds (U.S. Environmental Protection Agency (EPA) 2012, http://www.epa.gov/acidrain/). The deposition of these acidic compounds in high-elevation montane habitats occurs in either rain or cloud water. The pH values for these waters have been measured at 2.1, which is extremely acidic (DeHayes *et al.* 1999, p. 789). Air pollution also results in the deposition and accumulation of sulfur and nitrogen (nitrates or ammonia or both) in forest soils, which can impact soil health (Driscoll *et al.* 2001, p. 12; Driscoll *et al*. 2003, p. 357, ITBCG 2010, p. 13). Regulations have been passed to reduce acid deposition, and while the Acid Rain Program, established under Title IV of the 1990 Clean Air Act Amendments, has reduced sulfur dioxide and nitrogen oxide emissions and average ambient concentrations, high levels of acid deposition continue in the northeastern United States (EPA 2009, p. 1; Driscoll *et al.* 2001, p. 6).

Information in our files suggests that deposition of acid may have several implications for the Bicknell's thrush and its habitat. First, deposition of acidic ions is

known to reduce soil calcium, which likely leads to calcium deficiencies that render red spruce needles vulnerable to freezing damage. This damage reduces a tree's tolerance to low temperatures and increases the occurrence of winter injury and subsequent mortality (DeHayes *et al.* 1999, p. 798). Second, acidic deposition may also increase soil aluminum availability, which may limit the ability of red spruce trees to take up water and nutrients through their roots (Cumming and Brown 1994, p. 597).

Information in our files also suggests that deposition of nitrogen, a major plant nutrient, may also affect Bicknell's thrush habitat when the nitrogen deposition acts in concert with increased spruce-fir mortality resulting from deposition of acid; deposition of nitrogen, a major plant nutrient, may also affect Bicknell's thrush habitat. In high elevation spruce-fir forests, nutrient cycling is naturally low due to slower decomposition and low biological nitrogen demand; however, high-elevation areas receive greater amounts of atmospheric nitrogen than do low-elevation areas (McNulty *et al.* 1991, p. 16). Several research studies document a shift in species vegetation that favors hardwood tree species when montane spruce-fir stands were exposed to naturally occurring and artificially manipulated levels of atmospheric nitrogen (McNulty *et al.* 2005, p. 290; McNulty *et al*. 1996, p. 109; Beckage *et al*. 2008, p. 4201). The resulting vegetation shift towards more hardwoods may decrease the quality of foraging or nesting areas for the Bicknell's thrush (IBTCG 2010, p. 13).

The petition goes on to suggest, without providing any supporting references, high spruce mortality, as a result of acid and nitrogen deposition, provides a more open

canopy and may expose adult Bicknell's thrush to greater risk of predation. The petitioner states the increase in exposure requires resident thrushes to spend more time being vigilant for predators instead of spending more time and energy on other vital life functions (Petition, p. 33). There is no evidence presented with the petition to support this concern. In fact, information in our files indicates that Bicknell's thrush frequently sing from exposed perches atop dead snags (Rimmer *et al.* 2001, p. 12). Furthermore, Rimmer *et al.* (2004, pp. 27, 30) found no significant differences in adult survivorship or breeding productivity of Bicknell's thrush between ski areas, which provide greater openings than would a solitary red spruce snag, and more natural areas. This study suggests that there is little risk of increased predation of Bicknell's thrush in the presence of red spruce snags, as a result of increased spruce mortality, and a more open canopy (Rimmer *et al.* 2004. pp. 22–27).

The petition suggests that ground-level ozone is another air pollutant that is putting Bicknell's thrush habitat at risk of long-term and potentially irreversible decline (Petition, p. 35). Ozone is the product of a reaction of sunlight on nitrogen oxide and hydrocarbons, which can cause foliage damage and lead to reduced growth in plants (Lovett and Tear 2008, pp. 4–5). To support this position, the petition provides information regarding the impacts that ground-level ozone has had on western conifers (Petition, p. 35). However, the petition acknowledges that ozone impacts to montane red spruce and balsam fir are not described. Likewise, we are also unaware of any information suggesting that ground-level ozone is impacting Bicknell's thrush habitat.

Summary of Atmospheric Deposition and Ground-Level Ozone — The results of the studies we discuss above suggest that Bicknell's thrush breeding habitat within the United States may decrease as a result of atmospheric acid and nitrogen deposition. Researchers have suggested that this deposition contributes to declines in red spruce and balsam fir in montane habitats, and may facilitate the establishment of hardwood species. Also, atmospheric deposition of acid and nitrogen is occurring throughout the species' breeding range. Therefore, information presented in the petition and readily available in our files indicates that the present or threatened destruction, modification, or curtailment of its range by impacts caused by atmospheric deposition of acid and nitrogen may be a threat to the Bicknell's thrush. Conversely, information provided by the petitioner and readily available information in our files does not indicate that the present or threatened destruction, modification, or curtailment of its range by ground-level ozone may be a threat to Bicknell's thrush. However, the potential for ground-level ozone to threaten habitat for the Bicknell's thrush will be further investigated during our 12-month status review.

Recreational, Telecommunication, and Wind Energy Development

The petitioner asserts that development for recreation (i.e., ski areas), especially the cumulative effect of multiple ski areas, directly results in the loss and fragmentation of Bicknell's thrush breeding habitat (Petition, pp. 35–36). Information in our files demonstrates that this concern is shared by others; however, the cumulative effects of these threats across the range of the Bicknell's thrush are poorly known (Rimmer *et al*.

2001, p. 21; Bredin and Whittam 2009, pp. 12, 13; COSEWIC 2009, p. 32), and the assessment of this threat is typically based on localized studies.

In Vermont, 13 mountains that are greater than 915 m (3,000 ft) elevation are developed for recreational skiing, and many of these ski areas offer mountain bike activities during the Bicknell's thrush breeding season (Rimmer *et al*. 2001, p. 21). Similar pressures may occur in New Hampshire and Maine, but less so in the Catskills and Adirondacks in New York (Rimmer *et al*. 2001, p. 21) and in Canada (COSEWIC 2009, p. 32). In the short term, construction of these recreational developments resulted in the loss of some amounts of Bicknell's thrush habitat (Rimmer *et al.* 2001, p. 21). For example, the proposed expansion of the Whiteface Mountain trail system in New York's Adirondack Mountains was expected to remove up to 4.8 ha (11.8 ac) of the Bicknell's thrush breeding habitat and isolate an additional 1.8 ha (4.4 ac) (Rimmer *et al*. 2004, p. 8). This loss constitutes up to 0.26 percent of the suitable habitat in the Adirondack Park's Whiteface Mountain Habitat Unit that includes high-elevation songbird habitat on Whiteface Mountain, Little Whiteface Mountain, Esther Mountain, Lookout Mountain, and Baldwin Hill, and less than 0.001 percent of the total breeding habitat available in the northeastern United States (Rimmer *et al*. 2004, p. 10).

Information in our files provides variable data on these developments' long-term impacts on local populations of the Bicknell's thrush. For example, research at the Stowe Mountain Resort on Mount Mansfield and the Stratton Mountain Resort in Vermont demonstrates that there are few differences in various Bicknell's thrush population and

reproductive parameters (including nest predation, nest success, parental care, movement patterns, survivorship, or productivity) between habitat patches at the ski areas and natural forests on each of the respective resorts' mountains (Rimmer *et al*. 2004, p. 2). Radio telemetry data reveals that adult thrushes avoid trail crossings wider than 50 m (164 ft), while trails 35 to 40 m (115 ft to 131 ft) in width exhibit some restrictions on the movement of Bicknell's thrush (Rimmer *et al*. 2004, p. 2). Yet, in a different study, Glennon and Karasin's (2004, p. 1) investigations of existing ski trails and glades on Whiteface Mountain in New York show no statistical differences in abundance of Bicknell's thrush. We interpret Glennon and Karasin's (2004) study to mean that, although the species may not cross some wider ski trails, Bicknell's thrush still successfully reproduces in the surrounding habitat. Therefore, these results suggest that while the construction of ski areas produces an immediate loss of Bicknell's thrush habitat, the birds may be able to adapt by shifting to reproduce in adjacent habitat if the ski trails do not completely fragment habitat to a degree that adult Bicknell's thrush movements are inhibited.

In addition to ski area development, the petitioner asserts that infrastructure development for telecommunication and wind energy projects poses a threat to Bicknell's thrush habitat (Petition, p. 37). Wind and telecommunications structures are often placed on exposed high-elevation areas (Petition, p. 37), which may include areas of suitable Bicknell's thrush breeding habitat. Information in our files indicates that construction of wind and telecommunication facilities potentially impacts the species through habitat removal.

Limited information is available from existing or proposed wind turbine sites (MacFarland *et al.* 2008, p. 5). In some instances, construction of these facilities, including their associated infrastructure (e.g., roads), can directly impact Bicknell's thrush habitat (Rimmer *et al.* 2001, p. 21; MacFarland *et al*. 2008, p. 1; COSEWIC 2009, p. 32). For example, Noble Environmental Power (2008, in. litt) calculates that their Granite Reliable wind power project, located on Owlhead Mountain and Mount Kelsey in New Hampshire, will result in the removal of approximately 23.5 ha (58 ac) of high-elevation spruce and spruce-fir forest, some of which is known to be occupied by Bicknell's thrush. In addition, several wind power projects are located within Bicknell's thrush habitat in Quebec and New Brunswick (COSEWIC 2009, p. 32). Although these projects result in the direct loss of habitat due to removal, secondary impacts may also be caused by these projects, including habitat fragmentation and possibly behavioral impacts, such as avoidance of turbine sites due to noise (COSEWIC 2009, p. 32).

There are few examples of completed wind turbine construction projects in Bicknell's thrush habitat, but MacFarland *et al.* (2008, p. 8) assess the relationship of Bicknell's thrush breeding habitat to available wind resources. The authors determine that nearly 94 percent of the potential Bicknell's thrush habitat found in the Northeastern Highlands region of Vermont overlaps areas of Class 4 (> 7 mps (15.7 mph)) or higher wind power, which are considered good resources for generating wind power with large turbines. However, the area of overlap between Bicknell's thrush habitat and Class 4 or higher wind areas represents only 7 percent of the total available high-value wind

resource area. The MacFarland *et al.* (2008, p. 8) analysis suggests that a large portion (93 percent) of the potentially suitable wind power terrain could be developed without directly impacting Bicknell's thrush habitat. A visual comparison of modeled Bicknell's thrush habitat with wind resource data from throughout the Bicknell's range yields a similar assessment as MacFarland *et al.*'s (2008) regional study (A. Tur, pers. comm. 2012). Loss of Bicknell's thrush habitat from wind power development may be a threat to the species if the development sites do not occur outside the area of overlap discussed above.

Summary of Recreational, Telecommunication, and Wind Energy Development — Development of recreational areas (including ski areas), wind turbines, and telecommunication facilities and their associated infrastructure (i.e., roads) has resulted in the loss and fragmentation of Bicknell's thrush habitat (IBTCG 2010, p. 12). The Bicknell's thrush may show some ability to adapt and persist in the vicinity of ski resorts (Rimmer *et al.* 2004, p. 1). The species may adapt similarly to the construction of wind turbines. Information presented in the petition and readily available in our files indicates that the present or threatened destruction, modification, or curtailment of its range by impacts attributed to recreational, telecommunication, and wind energy development may be a threat to the Bicknell's thrush.

Logging and Forest Fragmentation

The petition asserts that logging in Canada and northern Maine is "a prime threat"

to Bicknell's thrush breeding habitat (Petition, pp. 37–39). Specifically, the petitioner suggests that dramatic drops in Bicknell's thrush presence at Canadian monitoring sites over the last 1 to 2 decades provide a clear indication that logging damages habitat and threatens the long-term survival of the species. However, information in our files suggests that the Bicknell's thrush is often found in managed forests, and it is unclear how forestry practices alter the amount and suitability of breeding habitat in Canada and northern Maine (IBTCG 2010, p. 11).

Throughout the industrial highlands of Canada and northern Maine, the practice of clearcutting may impact Bicknell's thrush by temporarily removing forest habitat. But, the petitioner acknowledges, and information in our files suggests, that regeneration of balsam fir and spruce in these areas is known to result in the creation of breeding habitat (Ouellet 1993, p. 566; Chisholm and Leonard 2008, p. 218; COSEWIC 2009, p. 31; IBTCG 2010, p. 11; Petition 2010, p. 38). Following clearcutting, dense regeneration of spruce and fir often follows, resulting in the creation of suitable Bicknell's thrush breeding habitat (Nixon *et al.* 2001, p. 34; Chisholm and Leonard 2009, p. 218; IBTCG 2010, p. 11). Although Bicknell's thrush occupy 25- to 40-year-old second growth stands, optimal conditions for Bicknell's thrush occur in 5- to 12-year-old clear cuts that have high densities of the 5- to 10-cm-diameter (2 to 4 inches (in.)) stem class (Nixon *et al.* 2001, p. 39; Connolly *et al.* 2002, p. 338; Chisholm and Leonard 2008, p. 222). Despite the species' presence in managed forests, it is difficult to assess the immediate impacts of clearcutting on Bicknell's thrush because little work has been done to determine the extent to which the species makes use of mature forest habitat prior to the

implementation of forestry practices (COSEWIC 2009, p. 31).

Information in our files suggests other forestry practices may also impact Bicknell's thrush habitat. Specifically, precommercial thinning that reduces stem densities to maximize growth in remaining trees results in the reduced abundance of Bicknell's thrush (Chisholm and Leonard 2008, p. 222). Precommercial thinning could also directly destroy Bicknell's thrush nests because thinning is often conducted during the bird's nesting season (Makepeace and Aubry, unpubl. data in COSEWIC 2009, p. 31).

In addition to the petitioner's discussion of the impacts of forestry practices on breeding range habitat, information in our files indicates an ongoing loss and degradation of important forested wintering habitat through logging, subsistence farming, and human-caused fires (Rimmer *et al*. 2001, p. 4; Rimmer *et al*. 2005b, p. 228; Townsend and Rimmer 2006, p. 454; COSEWIC 2009, p. 32). As discussed above in the Species Information section, the Bicknell's thrush winters exclusively in the Greater Antilles. The overall loss of winter forest habitat, including the Bicknell's thrush preferred montane forests, has been severe (Rimmer et *al*. 2001, p. 4), and this loss may impact the species despite its flexibility in selection of wintering habitat types and elevation. For example, there is some evidence in the Dominican Republic that Bicknell's thrush exhibits sexual segregation based on geography and the segregation may be the result of birds moving from areas of disturbed habitat (Rimmer *et al*. 2001, p. 9). Indeed, less than 1.5 percent of original montane forest habitat remains in Haiti, and about 10 percent

remains in the Dominican Republic (Rimmer *et al*. 2001, p. 4). Jamaica has lost 75 percent of its original forest, and Cuba has lost 80 to 85 percent (Rimmer *et al*. 2001, p. 4). While the Dominican Government has established a number of areas to protect important forest habitat (Latta *et al*. 2003, p. 180), habitat loss due to illegal logging and slash-and-burn agriculture continues both there and in Haiti (Rimmer *et al*. 2005b, p. 1; Rimmer *et al*. 2005d, unnumbered page; Townsend and Rimmer 2006, p. 452; IBTCG 2010, p. 12). Furthermore, subsistence farming, involving free-ranging cattle and the presence of feral pigs, severely damages forest understory growth at some wintering sites in Hispaniola and degrades Bicknell's thrush wintering habitat quality (IBTCG 2010, p. 12).

Summary of Logging and Forest Fragmentation — Forestry practices may result in the loss and fragmentation of important Bicknell's thrush breeding habitat, particularly in the Canadian portion of the species range. Clearcutting may be beneficial by creating additional breeding habitat for the species, but this is difficult to assess because of a lack of information regarding habitat use of these forests prior to timber management (IBTCG 2010, p. 12). There is evidence that precommercial thinning occurring in occupied breeding habitat renders the area immediately unsuitable for nesting, thereby contributing to the loss of habitat. On the wintering grounds, habitat loss may be a serious concern, due to the species' restricted wintering habitat, as well as the historical and continuing loss of habitat to logging, subsistence farming, and fire (IBTCG 2010, p. 12). Therefore, information presented in the petition and readily available in our files indicates that the present or threatened destruction, modification, or curtailment of its range by logging and

forest fragmentation may be a threat to the Bicknell's thrush.

Summary of Factor A — Information presented in the petition and readily available in our files indicates that the present or threatened destruction, modification, or curtailment of the Bicknell's thrush range caused by: (1) Climate change; (2) atmospheric deposition of acid and nitrogen; (3) recreational (ski areas), telecommunication, and wind energy development; and (4) logging and forest fragmentation may be a threat to the Bicknell's thrush. Information presented in the petition and readily available in our files does not indicate that the present or threatened destruction, modification, or curtailment of the species' range as a result of ground-level ozone may be a threat to the Bicknell's thrush. However, the potential for ground-level ozone to threaten habitat for the Bicknell's thrush will be further investigated during our 12-month status review.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes.

Information Provided in the Petition

The petitioner did not present information suggesting that overutilization is affecting Bicknell's thrush populations.

Evaluation of Information Provided in the Petition and Available in Service Files

One reference in our files indicates that 3 of 108 Vermont nests monitored during the period of 1992 to 2000 were abandoned and that abandonment may be caused by researcher disturbance (Rimmer *et al*. 2001, p. 21). This appears to be an isolated circumstance, and we are unaware of any other instances of overutilization for commercial, recreational, scientific, or educational purposes.

Summary of Factor B — Information presented in the petition and readily available in our files does not indicate that overutilization for commercial, recreational, scientific, or educational purposes may be a threat to the Bicknell's thrush. However, whether this factor is a threat to the species will be further investigated during our 12-month status review.

C. Disease or Predation.

Information Provided in the Petition

Disease

The petitioner asserts that disease (e.g., avian malaria) could have a substantial effect on the population viability of the Bicknell's thrush (Petition, p. 40).

Predation

The petitioner states that climate change may increase predation of the Bicknell's thrush by altering environmental conditions currently limiting the distribution of predators, and allowing "novel predators" to access the bird's habitat (Petition, pp. 39–40). The petitioner also states that the red squirrel (*Tamiasciurus hudsonicus*), a known Bicknell's thrush nest predator, may become more abundant as a result of climate change, which the petitioner suggests will bring about increased production of balsam fir cones (Petition, p. 40). The petitioner asserts that red squirrel populations are closely tied to balsam fir cone crop production. As climate change progresses cyclical production of heavy cone crops is expected to increase in frequency. This may result in increasing numbers of squirrels and, with it, increasing depredation of the Bicknell's thrush eggs and nestlings (Petition, p. 40).

Evaluation of Information Provided in the Petition and Available in Service Files

Disease

The petitioner asserts that disease (e.g., avian malaria) could have a substantial effect on the population viability of the Bicknell's thrush (Petition, p. 40). While the petitioner provides information regarding the presence of avian malaria in New England and some bird species, the petitioner acknowledges that "bird populations have largely adapted to malarial parasites" and provides no information indicating that avian malaria or other diseases may be a threat to the Bicknell's thrush. In addition, we are unaware of any information that may substantiate this speculation. Therefore, the information

presented in the petition and readily available in our files does not indicate that disease may be a threat to the Bicknell's thrush. However, disease impacts to the Bicknell's thrush will be further investigated as part of our 12-month status review.

Predation

Documented predation of adult Bicknell's thrush is limited to only a few predators. Of 8 depredation events on radio-tagged breeding adults, 7 were attributed to the sharp-shinned hawk (*Accipiter striatus*) and 1 to the long-tailed weasel (*Mustela frenata*) (Rimmer *et al*. 2001, pp. 13–14). On the wintering grounds, of 53 radio-tagged individuals, 5 were depredated by introduced Norway (*Rattus norvegicus*) and black (*Rattus rattus*) rats, presumably while the birds were sedentary on their nocturnal roosts (Townsend *et al*. 2009a, p. 565). The available information suggests that predation of adult Bicknell's thrush is not a threat to the species on a population level, although it may influence winter roost site selection (Townsend *et al*. 2009a, p. 568).

The sharp-shinned hawk, American marten (*Martes americana*), long-tailed weasel, deer mouse (*Peromyscus maniculatus*), and blue jay (*Cyanocitta cristata*) are known to be predators of bird eggs and nestlings. The red squirrel is the only predator known to have a major impact on the demographic characteristics of the Bicknell's thrush (Wallace 1949, p. 216; COSEWIC 2009, p. 19; IBTCG 2010, p. 6). Wallace (1949, p. 215) suggests that high mortality and low breeding rate contribute to the restricted distribution of the Bicknell's thrush. He notes that 9 of 13 observed nests on Vermont's

Mount Mansfield failed, while only 2 of the remaining nests were fully successful. While acknowledging the limitations of his small, 1-year sample size, Wallace (1949, p. 215) at the time concludes that the Bicknell's thrush population is either no more than stable or more likely declining because the production of 0.85 young fledged per pair constitutes a rate at which adults are unable to replace themselves during two seasons.

Since Wallace's observations, additional evidence demonstrates a somewhat loose 2-year (biennial) cycle in nest survival rates on Stratton Mountain and Mount Mansfield, Vermont (Rimmer *et al*. 2001, p. 19). This Bicknell's thrush biennial pattern is attributed to the biennial pattern of balsam fir cone crop production and red squirrel abundance. A fall season with abundant cone production is followed by a spring and summer with high numbers of red squirrels, and results in high nest predation rates and low productivity in Bicknell's thrush. In some years, no Bicknell's thrush young are produced (COSEWIC 2009, p. 17). The second part of the biennial cycle is explained when years of abundant cone production are followed by years when few cones are produced; accordingly, red squirrel numbers drop, along with nest predation rates, and Bicknell's thrush nesting success can reach as high as 90 percent (Rimmer *et al*. 2001, p. 19).

The petitioner asserts, with no supporting information, climate change may alter this biennial cycle of balsam fir cone production and red squirrel abundance (Petition, p. 40). Information in our files suggests balsam fir cone production has been linked to climatic variables (Messaoud *et al.* 2007). For example, two variables that may be associated with increased balsam fir reproduction potential are the number of growing

degree days greater than 5 ^{o}C (41 ^{o}F) and the maximum temperature of the warmest month in the year prior to cone production (Messaoud *et al.* 2007, p. 753). As a consequence, it may be reasonable to assume that increased temperatures attributed to climate change may lead to increased cone production. However, we have no information to suggest that taking that assumption further, to link the increase in balsam fir cone production to an increase in squirrel densities and a resulting decrease in Bicknell's thrush productivity throughout the bird's breeding range, is reasonable, because it is unclear if or when this climate change-induced alteration of the biennial cycle may occur.

In addition to biennial cycle disruptions, the petition also asserts that climate change will allow "novel" predators (i.e., previously unknown), such as the raccoon (*Procyon lotor*), to move into previously unoccupied habitat as vegetation types shift (Petition, p. 40). Information in our files indicates that the red fox (*Vulpes vulpes*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), and raccoon have all been observed in Bicknell's thrush breeding habitat, and no predation by these species is mentioned (Wallace 1949, p. 215; Rimmer *et al.* 2001, p. 14). These observations do not suggest that climate change may increase exposure of Bicknell's thrush to novel predators.

Summary of predation — We have no information to suggest that adult Bicknell's thrush predation or predation by novel predators may be a threat to the species. In addition, there is no information to suggest existing nest predation by red squirrels may increase to a level impacting the species throughout its breeding range if climate change-

induced warmer temperatures result in an increase in balsam fir cone production and subsequent red squirrel numbers. However, we will fully investigate predation in our 12-month status review.

Summary of Factor C — Information presented in the petition and readily available in our files does not indicate that disease or predation may be a threat to the Bicknell's thrush.

D. The Inadequacy of Existing Regulatory Mechanisms.

Information Provided in the Petition

The petition states that existing Federal, state, or international regulatory mechanisms protecting the Bicknell's thrush or its habitat are inadequate. More specifically, the petition states that existing international and U. S. regulatory mechanisms to reduce global greenhouse gas emissions are inadequate to safeguard the Bicknell's thrush against extinction resulting from climate change (Petition, p. 40).

Evaluation of Information Provided in the Petition and Available in Service Files

Species-specific regulatory mechanisms

The petitioner cites national and international regulatory mechanisms that are generic to migratory birds, as well as some that are specific to the Bicknell's thrush (Petition, pp. 41–42, 44). For example, the petitioner asserts that existing Federal regulatory mechanisms, including the Migratory Bird Treaty Act of 1918, as amended (MBTA), do not protect habitat for migratory birds, including the Bicknell's thrush. In the United States, under the MBTA, it is unlawful to take, capture, kill, or possess migratory birds, their nests, eggs, and young. The MBTA was not crafted to specifically protect habitat, although it may provide indirect benefits to migratory bird habitat, and, therefore, cannot be considered an inadequate existing regulatory mechanism for habitat protection. In addition, the petitioner further states that the Migratory Bird Conservation Act, the Neotropical Migratory Bird Conservation Act, and the identification of birds of management concern through the Birds of Conservation Concern apply to the Bicknell's thrush. These various actions are intended to foster proactive conservation, are nonregulatory (Petition, pp. 41–42; USFWS 2008, p. 30) and, therefore, cannot be considered inadequate existing regulatory mechanisms.

As for international regulatory mechanisms, the Bicknell's thrush is protected in Canada under the Migratory Birds Convention Act of 1994. In addition, the Committee on the Status of Endangered Wildlife in Canada designated the bird as threatened in Quebec, New Brunswick, and Nova Scotia (COSEWIC 2009, pp. iii, vi). The COSEWIC is a panel of species experts who evaluate the conservation status of Canadian species according to a set of criteria and recommend which species should be protected under Canada's Species at Risk Act (SARA). While COSEWIC has evaluated the Bicknell's

thrush as a threatened species, the Minister of Environment has not yet added the species to SARA's Schedule 1 (threatened and endangered wildlife). Bicknell's thrush is considered a SARA Schedule 3 Species of Concern, which means the Schedule 1 protection and conservation provisions of SARA do not apply. With regard to the Dominican Republic and Haiti, the petitioner asserts that current protections are minimal and confined to the designation of several national parks that provide limited protection to a small portion of the bird's wintering habitat where habitat degradation due to human activities continues (Petition, pp. 55–56). Although not specifically stated by the petition under Factor D, the petition asserts in Factor E that wintering habitat in Cuba is inadequately managed (Petition, p. 56). We have no readily available information in our files that addresses the regulatory mechanisms that may or may not be protective of Bicknell's thrush in Canada or the Greater Antilles. We will further investigate Canadian and Greater Antilles regulations during our 12-month status review.

The petitioner provides no information regarding any action taken by a state or provincial entity that specifically protects the Bicknell's thrush under existing authorities for threatened or endangered wildlife, but does provide information on how forested habitat, which may be occupied by Bicknell's thrush, is managed in each state (Petition, pp. 47–54). Information in our files indicates that the Bicknell's thrush has been identified as a species of special concern in Maine, New York, Vermont, and New Hampshire (IBTCG 2010, p. 7). Species afforded this designation receive no legal status under existing state endangered species statutes. Similarly, the species is considered "vulnerable" in Nova Scotia and "may be at risk" in New Brunswick and Quebec, but

these designations provide little to no additional protection (IBTCG 2010, p. 7; Petition, p. 44).

In the Puerto Rican portion of its wintering range, the Bicknell's thrush is protected under the MBTA, as described previously. The petitioner provides no information, and we are not aware of any information, regarding the legal status of Bicknell's thrush in the Dominican Republic, Haiti, Jamaica, or Cuba. In addition, we have no readily available information, either from the petition or in our files, on any existing regulatory mechanisms that would provide specific protections for the Bicknell's thrush in the national parks of Hispaniola.

Summary of Species-Specific Regulatory Mechanisms —We will further investigate whether inadequate regulatory mechanisms that result in habitat loss in its wintering range may be a threat to the Bicknell's thrush during our 12-month status review.

Atmospheric Acid, Nitrogen Deposition, Mercury, and Ground-Level Ozone Regulatory Mechanisms

The petitioner asserts that amendments to the Clean Air Act in 1990 have strengthened regulations to control the emission of airborne pollutants, but it has not been effective in alleviating the harmful effects of mercury, acid deposition, ground-level ozone, or nitrogen nutrification in Bicknell's thrush habitat (Petition, p. 42). Specifically,

the petitioner asserts that EPA has delayed regulating mercury emissions as a result of legal actions against the agency, while regulations to control acid deposition have not been ambitious enough to address the problem (Petition, p. 43). Furthermore, the petitioner asserts that, while the 1990 Clean Air Act amendments have helped reduce nitrogen dioxide emissions that lead to ozone pollution, greater reductions are needed to prevent ongoing ozone pollution that the petitioner states is damaging the habitat of Bicknell's thrush (Petition, p. 43). The petitioner also states that an international agreement to regulate mercury pollution is being developed, but has not yet been implemented (Petition, p. 44).

As discussed above in Factor A, information presented in the petition and readily available in our files does not indicate that ground-level ozone may be threat to the Bicknell's thrush. Therefore, ground-level ozone may be adequately regulated.

Summary of Atmospheric Acid, Nitrogen Deposition, Mercury, and Ground-Level Ozone Regulatory Mechanisms — As discussed in Factor A, deposition of acid precipitation and nitrogen nutrification may be threats to the species' habitat. As discussed in Factor E, deposition of mercury may also be a threat to the species. While the Clean Air Act amendments have reduced the overall levels of mercury, acid deposition, and ground-level ozone, the Clean Air Act amendments have not alleviated the harmful effects of those pollutants on the Bicknell's thrush and its habitat (see Factors A and E). Therefore, the information presented in the petition and readily available in our files indicates that inadequate regulatory mechanisms for atmospheric acid, nitrogen

deposition, and mercury impacts to the Bicknell's thrush habitat may be a threat to the bird. However, information presented in the petition and readily available in our files does not indicate that inadequate regulatory mechanisms for ground-level ozone may be a threat to the Bicknell's thrush.

Climate Change Regulatory Mechanisms

Finally, the petitioner states that the effect of climate change on the montane habitat of the Bicknell's thrush is the most serious threat to its continued existence, and that existing international and U. S. regulatory mechanisms to reduce global greenhouse gas emissions are clearly inadequate (Petition, pp. 40, 44). The petitioner argues that national and international reductions in emissions are urgently needed to safeguard the Bicknell's thrush against extinction resulting from climate change.

The Clean Air Act of 1970 (42 U.S.C. 7401 *et seq.*), as amended, requires the EPA to develop and enforce regulations to protect the general public from exposure to airborne contaminants that are known to be hazardous to human health. In 2007, the Supreme Court ruled that gases that cause global warming are pollutants under the Clean Air Act, and that the EPA has the authority to regulate carbon dioxide and other heat trapping gases (Massachusetts *et al*. v. *EPA* 2007 [Case No. 05-1120]). The EPA published a regulation to require reporting of greenhouse gas emissions from fossil fuel suppliers and industrial gas suppliers, direct greenhouse gas emitters, and manufacturers of heavy duty and off-road vehicles and engines (74 FR 56260; October 30, 2009). The

rule, effective December 29, 2009, does not require control of greenhouse gases; rather it requires only that sources above certain threshold levels monitor and report emissions (74 FR 56260; October 30, 2009). On December 7, 2009, the EPA found under section 202(a) of the Clean Air Act that the current and projected concentrations of six greenhouse gases in the atmosphere threaten public health and welfare. The finding itself does not impose requirements on any industry or other entities but is a prerequisite for any future regulations developed by the EPA.

As of August 24, 2010, the time of the petition's receipt, it was not known what regulatory mechanisms would be developed in the future as an outgrowth of EPA's finding that the Clean Air Act is insufficient to regulate greenhouse gases or how effective they would be in addressing climate change. Climate change regulations, and to what extent they adequately address threats to Bicknell's thrush and its habitat, will be investigated in our 12-month status review.

Summary of Factor D —The inadequacy of existing regulatory mechanisms for (1) Factor A—the present or threatened destruction, modification, or curtailment of the species' habitat caused by climate change; atmospheric deposition of acid and nitrogen; and recreational (ski areas), telecommunication, and wind energy development; and (2) Factor E (see discussion below)—other natural or manmade factors affecting its continued existence resulting from: atmospheric mercury deposition; decreased dietary calcium; increased interspecific competition facilitated by climate change; and collision with stationary and moving structures may be a threat to Bicknell's thrush.

E. Other Natural or Manmade Factors Affecting Its Continued Existence.

Information Provided in the Petition

The petitioner asserts that mercury exposure and accumulation, decreased dietary calcium due to acid deposition, direct mortality caused by climate change, increased interspecific competition caused by climate change, and disturbance by recreationists are all threats to the Bicknell's thrush.

Evaluation of Information Provided in the Petition and Available in Service Files

Mercury

The petitioner discusses information regarding the atmospheric deposition of mercury, a potent neurotoxin, and the process by which it accumulates in the Bicknell's thrush (Petition, pp. 56–58). According to the petition, mercury originating mostly from coal-fired power plants accumulates in wildlife and is influencing some wildlife populations. The petitioner recognizes documentation of methylmercury burdens, the toxic form of mercury, in terrestrial montane songbirds is a recent discovery (Petition, p. 57). Among four evaluated songbirds, the Bicknell's thrush had the highest blood mercury concentrations, with birds in the southern portion of the species' range having higher loads than in northern areas. In addition, atmospheric deposition of mercury is

two to five times higher in montane areas than in adjacent low-elevation areas (Petition, p. 57).

Elevated levels of toxic mercury have been found in Bicknell's thrush tissue and may be cause for concern (IBTCG 2010, p. 13). Mercury in the northeastern United States and eastern Canada is derived from local, regional, and global emissions; however, most estimates show that approximately 60 percent of mercury in this area is derived from sources located within the United States (Evers 2005, p. 5). Mercury toxicity is largely dependent upon whether it is converted to the bioavailable toxic form known as methylmercury, as well as an organism's trophic position (e.g., its level in the food chain). Trophic position influences mercury exposure due to the processes of bioaccumulation (increase in the body over time) and biomagnification (increase in concentration from one trophic level to another) (Evers 2005, p. 6). Generally, a species that is higher in the food chain has a greater exposure to mercury if its prey has mercury in its body when consumed as food.

Mercury deposition is highest on high mountain summits in comparison to other landscape positions primarily as a result of the summits' greater exposure to cloud-based mercury sources (Miller *et al.* 2005, p. 63). Compounding this problem, evergreen foliage generally exhibits higher mercury concentrations than deciduous foliage at the same site. These higher concentrations are due to the longer retention time of mercury in needles as compared to leaves, which are typically shed annually (Miller *et al.* 2005, p. 62). Consequently, the high-elevation montane insectivores, such as songbirds, that

consume insects feeding on this vegetation contain relatively high levels of mercury when compared with other songbirds from low-elevation habitats. Of those montane insectivores, the Bicknell's thrush has the highest concentrations of mercury, ranging from 0.08 to 0.38 micrograms/gram across 21 distinct breeding sites (Rimmer *et al.* 2005c, pp. 227, 232). Although no clear pattern in mercury levels was observed, mercury concentrations in the blood and feathers of Bicknell's thrush from southern portions of the species' breeding range were highest, which implies greater atmospheric deposition rates (Rimmer *et al.* 2005c, p. 235). In addition, blood mercury concentrations in wintering birds were generally 2 to 3 times higher than in birds sampled on their breeding sites (Rimmer *et al.* 2005c, p. 230). The authors state that this result is unexpected and counter to what they would have expected given the lack of local or regional industrial sources of mercury in the wintering range (Rimmer *et al.* 2005c, p. 235). Further studies of the Bicknell's thrush biochemical processes may illuminate the reason behind the higher mercury level in the wintering range. Although we do not know the exact cause of the elevated blood mercury levels, the information indicates that there may be a differing level of exposure between the breeding and wintering grounds, and that the source of the exposure mechanism, as well as the elevated blood mercury level itself, may pose a threat to the species.

The specific pathway by which the Bicknell's thrush consumes mercury and the effects that the burden has on the birds is unknown (Rimmer *et al.* 2005c, p. 237; Evers 2005, p. 16). Although species-specific responses to mercury concentrations make direct comparisons unreliable, studies of aquatic birds (e.g., mallard ducks and common loons)

indicate changes in behavior, reproduction, and body chemistry are possible (Evers 2005, p. 6; IBTCG 2010, p. 13).

Summary of Mercury Effects — Information presented in the petition and readily available in our files indicates that atmospheric deposition of mercury may be a threat to the Bicknell's thrush.

Decreased dietary calcium

The petitioner asserts that acid deposition impacts the habitat of the Bicknell's thrush by reducing calcium availability that has been shown to influence survival of red spruce. The petitioner also asserts that acid deposition can directly alter calcium availability for breeding songbirds that may impact eggshell production (DeHayes *et al.* 1999, p. 798; Petition, p. 58; IBTCG 2010, p. 13). Acid deposition leaches calcium from red spruce forest soils, including soils from many Bicknell's thrush breeding sites (DeHayes *et al.* 1999, p. 798; Driscoll *et al.* 2001, p. 11). This reduction in the availability of calcium has been linked to declines in the calcium levels in some invertebrate prey items and reduced dietary calcium for songbirds, including the wood thrush in the eastern United States, through the bioaccumulation and biomagnifications processes mentioned above (Mand *et al.* 2000, p. 64; Hames *et al.* 2002, pp. 11238–11239). As discussed above in the *Species Information* section, insects are the primary food source for the Bicknell's thrush in its breeding range (Beal 1915 in Wallace 1939, p. 295; Rimmer *et al*. 2001, pp. 9–10). Although it has not been confirmed, calcium

depletion and lower availability may affect egg formation and productivity in the Bicknell's thrush, as has been suggested for the wood thrush, especially in "highland areas with thin and poorly buffered soils" (King *et al.* 2008, p. 2697).

Summary of decreased dietary calcium — Information presented in the petition and readily available in our files indicates that decreased dietary calcium from soil leaching by acid precipitation may be a threat to the Bicknell's thrush.

Direct mortality due to climate change

The petitioner asserts that increased storm frequency and intensity have the potential to increase mortality in the Bicknell's thrush (Petition, p. 58). Information in our files suggest most Bicknell's thrush nesting failures are attributed to predation, but climate change scenarios predict increases in the frequency of wind and precipitation that may result in additional nest failures (Hayhoe *et al.* 2007, p. 389; IBTCG 2010, p. 14). In addition, more frequent tropical storms and increasing erratic weather caused by climate change (Angeles *et al.* 2007, p. 567) may increase mortality of migrating Bicknell's thrush (IBTCG 2010, p. 14; Petition, p. 58). The sources of information in the petition and our files do not contain an analysis or modeling of storm events to determine the extent to which the storm events may be a threat to the Bicknell's thrush species as a whole. We do not have information regarding whether mortality is occurring, or if it is occurring, whether impacts to individual Bicknell's thrushes relates to impacts to the species as a whole.

Summary of direct mortality — Information presented in the petition and readily available in our files does not indicate that direct mortality resulting from climate change may be a threat to the Bicknell's thrush. However, we will fully investigate direct mortality resulting from climate change during our 12-month status review.

Increased interspecific competition with climate change

The petitioner asserts that climate change will increase encroachment of the Bicknell's thrush by competitors that were formerly restricted to lower elevations (Petition, p. 58). The petition acknowledges that the Swainson's thrush (*Catharus ustulatus*) is the only potential competitor that has been discussed in the scientific literature (Petition, p. 58). The Bicknell's and Swainson's thrushes generally inhabit mutually exclusive elevation ranges. There are slight overlaps in the lower elevation portion of the Bicknell's thrush breeding range (Able and Noon 1976, p. 287), as well as in regenerating stands following commercial forestry operations in New Brunswick (Nixon *et al.* 2001, p. 34). Swainson's and Bicknell's thrushes may compete for nesting territories, and observations of the two species demonstrate occasional agonistic encounters on the breeding grounds, including chases and displacement from song-posts (Able and Noon 1976, p. 287; Rimmer *et al.* 2001, p. 13).

The Bicknell's thrush is considered to be better adapted to colder environments than is the Swainson's thrush (Holmes and Sawyer 1975 in Nixon *et al.* 2001, p. 38).

Lambert et al. (2005, p. 7) suggest that a rise in summer temperatures could reduce separation between the two species by nullifying Bicknell's thrush's greater tolerance for cold, thereby facilitating the establishment of Swainson's thrush at higher elevations. Information in our files indicates that temperatures may be an important factor in the distribution of these two thrush species (Holmes and Sawyer 1975 in Nixon *et al.* 2001, p. 38), and climate change may allow Swainson's thrush to breed at higher elevations.

Summary of increased interspecific competition — Information presented in the petition and readily available in our files indicates that increased interspecific competition from Swainson's thrush as a result of increasing temperatures associated with climate change may be a threat to the Bicknell's thrush.

Disturbance by recreationists

The petitioner asserts that recreational use (hiking and biking) in Bicknell's thrush habitat poses a threat to the species (Petition, p. 59; IBTCG 2010, p. 12). The petitioner states that the backcountry areas of the White Mountain National Forest in New Hampshire, including the high-elevation spruce-fir habitat occupied by the Bicknell's thrush, received about 31,400 visitors in 2005 (Petition, p. 59; King *et al.* 2008, p. 2698). Similar visitation is expected in New York's Adirondack Park (IBTCG, p. 12). Research suggests that nesting Bicknell's thrush are able to tolerate high or moderate levels of human activity by becoming habituated to nearby disturbance, while females in undisturbed areas demonstrate greater sensitivity to disturbance (Rimmer *et al.* 2001, p.

21). Off-trail excursions by hikers into vegetation that may contain a Bicknell's thrush is unlikely, given the thick habitat preferred by the species (Wallace 1939, p. 285). As a result, most recreational use is confined to the existing trails (A. Tur, pers. observation 2012). Hiking trails impact a very small portion of the available Bicknell's thrush nesting habitat, and, therefore, it seems unlikely that recreational activities in the Bicknell's thrush breeding habitat may be a significant threat.

The petitioner cites Rimmer *et al.* (2001) as a source of research information regarding disturbance of nesting Bicknell's thrush by bicyclists. However, Rimmer *et al.* (2001, p. 21) merely acknowledge that mountain biking occurs on ski area trails during the summer months. The authors do not provide any analysis of whether mountain bike use causes disturbance to the species, and we have no other information to suggest that mountain biking may be a threat to the Bicknell's thrush.

Summary of disturbance by recreationists — Information presented in the petition and readily available in our files does not indicate that recreational disturbance may be a threat to the Bicknell's thrush. However, the role of recreational activities as a potential threat to the species will be further investigated during our 12-month status review.

Collision with and disturbance by stationary and moving structures

As previously described above in Factor A and as indicated in the petition, construction of telecommunications structures (stationary structures) and wind turbines

(moving structures) on exposed high-elevation areas (Petition, p. 37) can directly impact Bicknell's thrush habitat (Rimmer *et al.* 2001, p. 21; MacFarland *et al.* 2008, p. 1; COSEWIC 2009, p. 32). In addition to habitat impacts, information in our files suggests that construction and operation of these facilities may also impact the species by increasing injury and direct mortality of individuals through take of Bicknell's thrush nests if construction occurs in occupied breeding habitat, and collisions occur with telecommunication towers and, if present, the guy wires used to support them (Rimmer *et al.* 2001, p. 20; MacFarland *et al.* 2008, p. 3). Mortality of birds resulting from collision with wind turbines has also been documented (Johnson *et al.* 2002, p. 879; USFWS 2003, p. 1), including thrush species (Erickson *et al.* 2001, pp. 59, 61; Jain *et al.* 2007, pp. 43–44). While we have no information on specific injury or mortality to Bicknell's thrush, we find that documented injury and mortality of similar species indicates that collision with stationary and moving structures may be a threat to the Bicknell's thrush.

Information in our files suggests that individual Bicknell's thrush may be disturbed by wind towers and exhibit avoidance of wind turbine areas in response to noise and movement from the spinning blades (MacFarland *et al.* 2008, p. 5). However, the impact of turbine construction and operation to Bicknell's thrush in the vicinity of these structures has not been assessed by the authors (MacFarland *et al.* 2008, p. 5) as a threat to the species as a whole, only a mention that some individuals may avoid turbines. Therefore, information presented in the petition and readily available in our files does not indicate that disturbance, as discussed above as active avoidance of wind turbine areas due to noise, may be a threat to the Bicknell's thrush.

Summary of collision with and disturbance by stationary and moving structures — Information presented in the petition and readily available in our files indicates that collision with stationary and moving structures may be a threat to the Bicknell's thrush, but does not indicate that disturbance from wind turbines may be a threat to the bird.

Summary of Factor E — Information presented in the petition and readily available in our files indicates that other natural or manmade factors affecting the Bicknell's thrush continued existence resulting from: atmospheric mercury deposition; decreased dietary calcium; increased interspecific competition facilitated by climate change; and collision with stationary and moving structures, may be threats to the bird. Information presented in the petition and readily available in our files does not indicate that other natural or manmade factors affecting the Bicknell's thrush continued existence resulting from more frequent storms caused by climate change, disturbance by recreationists, and disturbance by wind turbines, may be threats to the bird.

Finding

On the basis of our determination under section 4(b)(3)(A) of the Act, we determine that the petition presents substantial scientific or commercial information indicating that listing the Bicknell's thrush throughout its entire range may be warranted. This finding is based on information provided under factors A, D, and E. We determine that the information provided under factors B and C is not substantial.

Because the petition presents substantial information indicating that listing the Bicknell's thrush may be warranted, we will be initiating a status review to determine whether listing the Bicknell's thrush under the Act is warranted.

The "substantial information" standard for a 90-day finding differs from the Act's "best scientific and commercial data" standard that applies to a status review to determine whether a petitioned action is warranted. A 90-day finding does not constitute a status review under the Act. In a 12-month finding, we will determine whether a petitioned action is warranted after we have completed a thorough status review of the species, which is conducted following a substantial 90-day finding. Because the Act's standards for 90-day and 12-month findings are different, as described above, a substantial 90-day finding does not mean that the 12-month finding will result in a warranted finding.

References Cited

A complete list of references cited is available on the Internet at *http://www.regulations.gov* and upon request from the New England Field Office (NEFO) (see **FOR FURTHER INFORMATION CONTACT**).

Author

The primary authors of this notice are the staff members of the NEFO.

Authority

The authority for this action is the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.).

Date: July 31, 2012

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Daniel M. Ashe

Director, U.S. Fish and Wildlife Service

Billing Code 4310-55-P

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