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December 22, 2019

Ms. Lauren Cusick
Rural Utility Service
1400 Independence Ave. SW, Room 2244
Washington, DC 20250

FWS No. 03E19000-2018-F-0180 Cardinal – Hickory Creek 345-kV Transmission Line;
Formal Consultation on Rusty Patched Bumble Bee; Informal Consultation on Iowa
Pleistocene snail and northern wild monkshood

Dear Ms. Cusick:

This document transmits the U.S. Fish and Wildlife Service's (Service) revised biological opinion (Opinion) based on our review of the referenced project and its effects on the federally listed endangered rusty patched bumble bee (*Bombus affinis*, hereafter RPBB) in accordance with Section 7 of the Endangered Species Act (16 U.S.C. 1531-1544, 87 Stat. 884), as amended.

This Opinion acts as an addendum to our previously submitted Biological Opinion dated May 31, 2019. The Service revised the Opinion to focus solely on the selected alternative route and updated the RPBB take estimates to reflect the selected route. All mentions of the other routes were removed from the Opinion.

This Opinion is based on information provided in the 2 November 2018 biological assessment as well as telephone conversations, field investigations, and other sources of information. The biological assessment also included a request for Service concurrence with "not likely to adversely affect" determinations as well as stated "no effect" determinations for other federally listed species. It is Service policy to not respond to "no effect" determinations, however, we acknowledge that potential impacts were considered and analyzed for whooping crane, Higgins eye pearl mussel, spectaclecase, Hine's emerald dragonfly, Mead's milkweed, prairie bush clover, eastern prairie fringed orchid and western prairie fringed orchid.

The Rural Utilities Service (RUS) determined the proposed action is not likely to adversely affect the Iowa Pleistocene snail (*Discus macclintocki*) or northern wild monkshood (*Aconitum noveboracense*) because habitat associated with occupied areas for these species will not be directly affected. Transmission line poles will not be placed on cliffs or argillic talus slopes

(suitable to both species) or immediately adjacent to cold-water streams (indicator of suitable habitat for northern wild monkshood only). Transmission lines will span potential habitat for both species, however, no construction activities will occur within these sensitive habitats. Vegetation removal along other portions of the line may indirectly affect the steep slopes or waterways adjacent to the proposed action but are anticipated to be minimized by proposed conservation measures to the point that impacts would be unlikely. The Service concurs with your determination because all impacts that may be associated with this project on Iowa Pleistocene snail and northern wild monkshood are considered to be discountable. Further, RUS will rely on the 4(d) rule for impacts to the northern long-eared bat (*Myotis septentrionalis*) and has made the determination that the proposed action may affect, but take is not prohibited. Since all anticipated incidental take from the project were from activities addressed by the 4(d) rule and are therefore exempted, no reasonable and prudent measures were required. A complete administrative record of this consultation is on file in this office.

Please contact the Service if the project changes or new information reveals effects of the proposed action to proposed or listed species or critical habitat to an extent not covered in your biological assessment. If you have any questions or comments on this biological opinion, please contact Dawn Marsh at 952-252-0092 x 202 or at dawn_marsh@fws.gov.

Sincerely,

Shauna Marquardt
Assistant Field Supervisor

Enclosure

Cc (email only): RUS, Washington, DC (Attn: Dennis Rankin)
SWCA, Lombard, IL (Attn: Coleman Burnett)

REVISED BIOLOGICAL OPINION

Effects to Rusty Patched Bumble Bee
from the
Cardinal-Hickory Creek 345-kV Transmission Line

FWS TAILS Code: 03E19000-2018-F-0180

Prepared by:
U.S. Fish and Wildlife Service
Minnesota-Wisconsin Field Office

December 20, 2019

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INTRODUCTION

This biological opinion was issued to the Rural Utilities Service (RUS) by the U.S. Fish and Wildlife Service's (Service) and analyzed the effects to federally listed species described the *Cardinal – Hickory Creek 345-kV Transmission Line Biological Assessment* (hereafter referred to as the BA) (RUS 2018a) which extends approximately 101-miles from Dubuque County, Iowa to Dane County, Wisconsin. The BA was received at the Service's Minnesota-Wisconsin Ecological Services Field Office on November 2, 2018 as part of a letter requesting us to initiate formal consultation on potential adverse effects to the federally endangered rusty patched bumble bee (*Bombus affinis*; RPBB). This BA also requested consultation informally for impacts to the Iowa Pleistocene snail (*Discus macclintocki*) and northern wild monkshood (*Aconitum noveboracense*) and acknowledged that the 4d rule will be utilized for potential impacts to the northern long-eared bat (*Myotis septentrionalis*). The individual site-specific consultation under Section 7 of the Endangered Species Act was used to address one proposed project. This consultation analyzed the direct, indirect, and cumulative impacts from the management project on RPBB. The Service concluded that the effects of the Project are not likely to jeopardize the RPBB and no critical habitat has been designated.

This biological opinion was prepared in accordance with Section 7(a)(2) of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 et seq.) and is the culmination of formal Section 7 consultation under the Act. The purpose of formal Section 7 consultation is to insure that any action authorized, funded, or carried out by the Federal government is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of any officially designated critical habitat of such species. This biological opinion satisfies the Section 7(a)(2) consultation requirement for federal agencies. A complete administrative record is available at the Minnesota-Wisconsin Field Office.

CONSULTATION HISTORY

April 20, 2017: USFWS Information for Planning and Consultation (IPaC) review was initiated for the Wisconsin portion of Project to identify federally listed species present within the Project vicinity.

Aug. 2, 2017: USFWS State-of-Iowa county-species lists reviewed for Iowa portion of Project to identify federally listed species that may be present within the Project vicinity.

August 4, 2017: A conference call was held between ATC, Stantec, ITC, Burns & McDonnell, and USFWS to review federally listed species identified within the action area. Preliminary effects determinations for listed species, and the format and organization of the BA were discussed.

October 17, 2017: USFWS Information for Planning and Consultation (IPaC) review was initiated for the Iowa portion of Project to identify federally listed species that may be present within the Project vicinity.

January 5, 2018: USFWS submitted comments on preliminary draft Biological Assessment

November 2, 2018: SWCA submitted Biological Assessment on behalf of RUS and the document was determined to be complete. Targeted completion date was scheduled for March 18, 2019.

December 19, 2018: SWCA submitted updated GIS shapefiles of the proposed C-HC route to USFWS to verify project impact boundaries.

February 25, 2019: USFWS requested an extension for completing the Biological Opinion as a result of the 35-day Government shutdown. Request was granted on March 12, 2019 and the new completion date for formal consultation was scheduled for April 22, 2019.

March 25, 2019: USFWS updated RPBB connectivity model based on new 2018 observations. This resulted in two of the High Potential Zones (HPZ) analyzed in this Biological Opinion to increase in size and encompass more suitable habitat within the action area not previously considered under the BA.

October 30, 2019: USFWS agreed to write an addendum to the Biological Opinion to focus on Alternative 6.

November 5, 2019: SWCA submitted updated GIS shapefiles of the proposed C-HC route to USFWS to verify project impact boundaries.

SPECIES NOT ADDRESSED IN THIS BIOLOGICAL OPINION

Consultation has been completed informally for the Iowa Pleistocene snail and northern wild monkshood. All potential actions described in the BA resulted in a determination that the proposed actions may affect, but are not likely to adversely affect these two species. The Service has concurred that this proposed action would result in insignificant or discountable impacts to the Iowa Pleistocene snail and northern wild monkshood. A determination of “no effect” was made for nine additional species that had potential to be within action area; however, no suitable habitat was identified or anticipated to be impacted.

On January 14, 2016, the Service published a species-specific rule pursuant to section 4(d) of the ESA for the northern long-eared bat (81FR 1900). The Service's 4(d) rule for the northern long-eared bat exempts the take of northern long-eared bats from the section 9 prohibitions of the ESA, as follows:

- (1) Incidental take that is outside the white nose syndrome zone.
- (2) Incidental take that is inside the white nose syndrome zone, provided these activities:
 - a. Occur more than 0.25 mile (0.4 km) from a known, occupied hibernacula;
 - b. Avoid cutting or destroying known, occupied roost trees during the pup season (June 1–July 31); and
 - c. Avoid cutting or destroying any trees within a 150-foot (45 meter) radius of known, occupied roost trees during the pup season (June 1–July 31).
- (3) Removal of hazard trees (no limitations).
- (4) Purposeful take that results from
 - a. Protection of human health and safety;
 - b. Removal of bats from within human structures; and
 - c. Capture, handling, and related activities for northern long-eared bats by individuals permitted to conduct these activities for other species of bats until May 3, 2016.

Thus any take of northern long-eared bats occurring in conjunction with these activities that complies with the conservation measures, as necessary, is exempted from section 9 prohibitions by the 4(d) rule, and does not require incidental take authorization.

However, 4(d) rules do not afford exemption from the ESA's section 7 procedural requirements in and of

themselves. Therefore, the Service completed a biological opinion on the Service's action of finalizing and implementing the 4(d) rule. The biological opinion allows for streamlined consultation to meet section 7 requirements for all federal agency actions that may affect the northern long-eared bat, provided the agencies follow the criteria in the 4(d) rule and the biological opinion (USFWS 2015). Since the proposed actions are consistent with the intra-Service consultation for the 4(d) rule, a separate formal consultation is not required and the northern long-eared bat will not be addressed further in this Opinion.

BIOLOGICAL OPINION

The Federal action evaluated in this biological opinion (BO) is funding by the Rural Utilities Service (RUS) to allow for the authorized construction of Cardinal-Hickory Creek 345-kV Transmission Line. In addition to this action, the U.S. Army Corps of Engineers (Corps) will issue Clean Water Act section 404 permits for temporary fill to protected wetlands within their jurisdiction, and the Service will issue a Special Use Permit and easement for new or expanded rights-of-way (ROW) across a portion of the Upper Mississippi National Wildlife and Fish Refuge.

The Service is issuing this BO pursuant to Section 7 of the Endangered Species Act of 1973. Direct and indirect effects of Federal actions and their interrelated or interdependent activities are analyzed to ensure they are not likely to jeopardize the continued existence of federally listed or proposed endangered or threatened species. Indirect effects of the Federal actions include, "...effects that are caused by or result from the action, are later in time but are reasonably certain to occur..." Interdependent actions have no independent utility apart from the proposed action, and interrelated actions are part of a larger action and depend on the larger action for their justification (50 CFR §402.02).

DESCRIPTION OF PROPOSED ACTION

As defined in the ESA Section 7 regulations (50 CFR 402.02), "action" means "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States or upon the high seas." The "action area" is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action."

The following is a summary of the proposed action and a detailed description can be found in *Cardinal-Hickory Creek 345-kV Transmission Line Biological Assessment* submitted by the Rural Utility Service.

The Project is a new 345-kV transmission line connecting the Hickory Creek Substation in Dubuque County, Iowa with the Cardinal Substation in Dane County, Wisconsin. The Project also extends through Grant and Iowa Counties, Wisconsin and Clayton County, Iowa. Further, it includes a new intermediate 345/138-kV substation near the Village of Montfort in either Grant or Iowa County, Wisconsin. Some portions of the 345-kV line may be double circuited with existing lines along certain routes. In other areas, the Project would result in new cleared ROW or expansion of the existing transmission line or road ROW. The total length of the 345-kV transmission lines associated with the proposed Project will be approximately 125 miles and have a variable width ROW, typically between 150 and 200 feet.

Trees and brush will be cleared for the full width of the ROW to facilitate construction equipment access and ensure safe clearances between vegetation and the transmission line. This clearing will be done to facilitate construction. The ROW will be maintained free of tall growing vegetation throughout the operational life of the facility.

Vegetation will be cut at or slightly above the ground surface using mechanized mowers, sky trims, processors, harvesters, or by hand. Rootstocks will generally be left in place except in areas where stump grinding is necessary to facilitate the movement of construction vehicles. In areas of steep topography, access roads and work platforms may need to be constructed prior to construction access. This work is typically completed using equipment such as a bulldozer, track-hoe, skid-loader, and dump trucks. The travel surface of the access road is typically 14- to 20-foot wide and work platforms are typically 30 feet

by 30 feet. The total amount of disturbance of the road (cut slope to base of the spoils slope) is dependent on soil type and topography. Following construction, the access roads will be left in place or returned to prior conditions, depending on landowner preference. Construction matting will be installed to provide access through wetlands or other unstable soil areas where needed prior to construction access.

Construction matting may consist of timber, composite, or hybrid timber mats and will be installed with rubber-tired mat trucks, forwarders, forklifts, or skid loaders. Mat access roads will generally be 16- to 20-foot wide and mat work platforms may be as large as 100 feet by 100 feet or more, depending on the type of structure.

Restoration will occur once Project work is complete. The Utilities will conduct ongoing monitoring to ensure re-vegetation and to minimize erosion. The need for and approach to site restoration and revegetation will be based on the degree of disturbance caused by construction activities and the ecological setting of each site, and will need to reflect and satisfy the requirements of the property owner. In areas where soil disturbance occurs, erosion control best management practices will be installed, maintained, and monitored until the area is revegetated to 70% cover.

CONSERVATION MEASURES

Conservation measures proposed as part of the action (measures that will avoid, minimize, and mitigate effects of the proposed action on the species and/or benefit the species as a whole) are referred to as avoidance and minimization measures (AMMs) in this Opinion. AMMs are provided in the BA but are summarized below.

- Prior to construction, areas within HPZs preliminary screened as low quality habitat or questionable habitat will be evaluated and documented using the Rusty Patched Bumble Bee Habitat: Assessment Form & Guide (Xerces Society 2017).
- Areas determined to contain suitable habitat within HPZs per the Rusty Patched Bumble Bee Habitat: Assessment Form & Guide (Xerces Society 2017) will be surveyed for RPBB no more than one year prior to construction per the Survey Protocols for the Rusty Patched Bumble Bee (*Bombus affinis*) (USFWS 2019c). Additional surveys may be performed more than one year prior to construction to guide project planning.
- Where RPBB is confirmed to be present, disturbance and vegetation clearing will be minimized to the extent possible along edges of woodlots and tree/shrub lines where nesting habitat is likely to be found.
- Seed mixes containing a diversity of native flowering plants will be used to re-seed existing suitable habitat areas that require re-vegetation/restoration within HPZs, as well as opportunity areas for expanding suitable habitat within known HPZs.
- The use of BMPs during construction and vegetation management activities to prevent the spread of invasive species will help to maintain greater plant diversity along the cleared transmission corridors.
- Herbicide application where used for vegetation management purposes in suitable habitat within HPZs will be targeted to limit the effects of the herbicide beyond the targeted species.

- Avoid or minimize impacts in areas documented to be occupied by RPBB through surveys; activities within occupied habitat will be sequenced with seasonal timeframes as much as is feasible (i.e. late spring/summer work in woodlands to avoid overwintering queens, late fall/winter work in open areas to avoid foraging and nesting sites).

ACTION AREA

Action area, as defined by the ESA's implementing regulations (50 CFR 402.02), is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (our emphasis). Action is defined in the regulations as "...all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Examples include, but are not limited to: (a) actions intended to conserve listed species or their habitat; (b) the promulgation of regulations; (c) the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid; or (d) actions directly or indirectly causing modifications to the land, water, or air.

The action area for the Project is defined as the area physically covered by the Project proposed ROW alternatives that will extend the entire length of the final corridor (approximately 125-miles and 150-foot wide), the temporary access routes, and the substation parcels (Figure 1). The approximate acreage for the action area is summarized by proposed route segment alternative in Table 1 of the Biological Assessment. The action area includes a crossing of the Upper Mississippi River National Wildlife and Fish Refuge. In addition, the action area includes anticipated access routes – both on ROW and off-ROW. Temporary construction access will primarily occur within the Project ROW from the closest public road; however, temporary off-ROW construction access may be required in some areas.

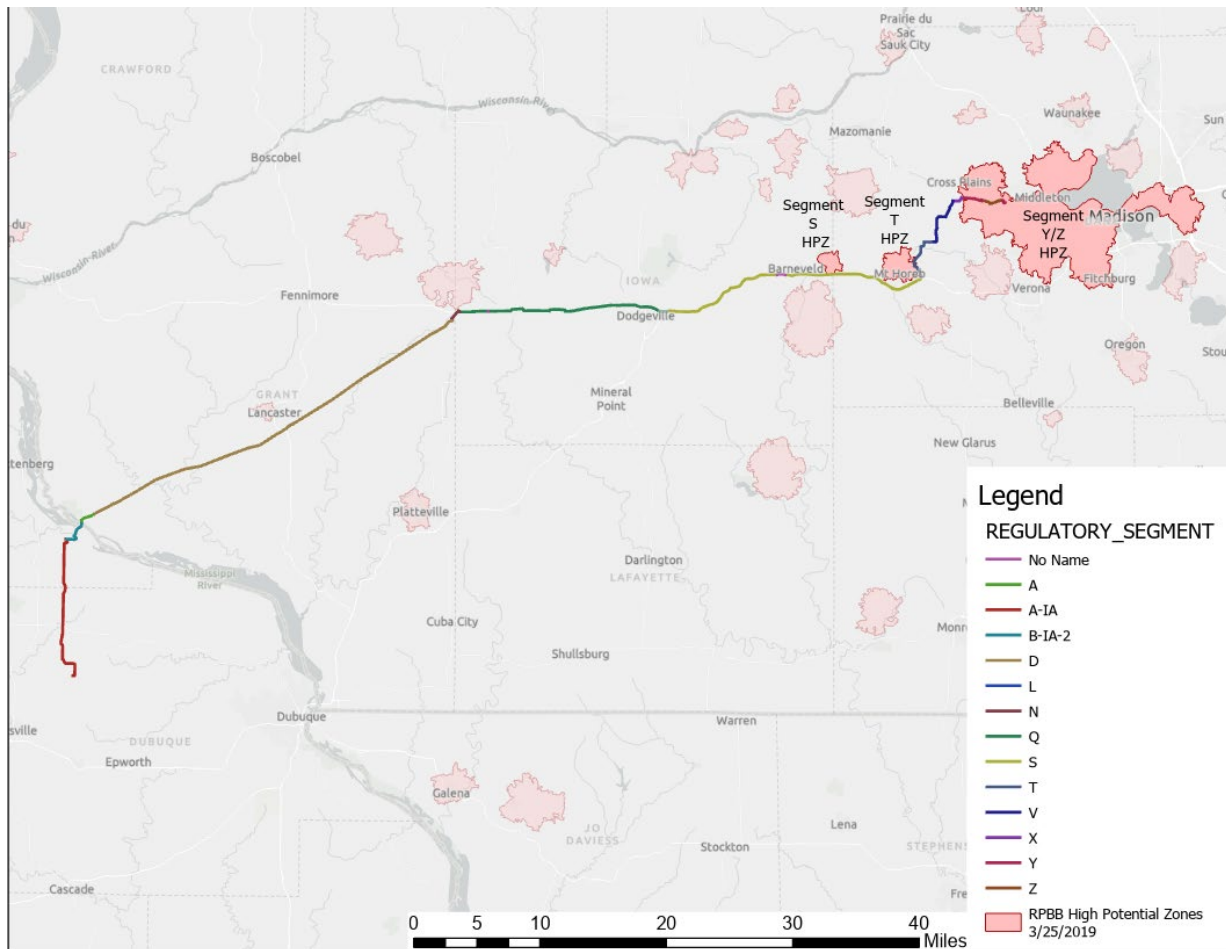


Figure 1. Cardinal – Hickory Creek Transmission Line Project Location and the Mapped High Potential Zones for the RPBB.

STATUS OF THE SPECIES

Per the ESA Section 7 regulations (50 CFR 402.14(g)(2)), it is the Service’s responsibility to “evaluate the current status of the listed species.”

To assess the current status of the species, it is helpful to understand the species’ conservation needs, which are generally described in terms of reproduction, numbers, and distribution (RND). The Service frequently characterizes RND for a given species via the conservation principles of resiliency (ability of species/populations to withstand stochastic events – numbers, growth rates), redundancy (ability of a species to withstand catastrophic events – number of populations and their distribution), and representation (variation/ability of a species to adapt to changing conditions) (collectively known as the three Rs).

As described by the Service (2016), the RPBB conservation needs include assessing resiliency to environmental variation, perturbations affecting habitat size and quality, and population size. Currently, as a whole, the rangewide status of the species is declining (82 FR 3186-3209). The primary factors

influencing the status include risks posed by “pathogens, pesticides, habitat loss and degradation, small population dynamics, and climate change” (82 FR 3186-3209). For a more detailed account of the species description, life history, population dynamics, threats, and conservation needs, refer to <https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=IOWI>.

STATUS OF CRITICAL HABITAT

No critical habitat has been designated for RPBB.

ENVIRONMENTAL BASELINE

Regulations implementing the ESA (50 CFR 402.02) define the environmental baseline as the past and present impacts of all federal, state, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated and/or ongoing impacts of all proposed federal projects in the action area that have undergone Section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation in progress.

STATUS OF THE SPECIES WITHIN THE ACTION AREA

The proposed action is within the historical range of RPBB in WI and IA. Prior to the mid-1990s, RPBB was widespread and considered common throughout its historical range. There are no historical records of RPBBs located in Dubuque County, Iowa; however, there are current records for the species located in the surrounding counties. The remainder of the proposed route has RPBB observations between 2014 and 2018 in close proximity and crosses areas designated as RPBB High Potential Zones (HPZ) by the Service at three locations (Figure 1).

High Potential Zones (HPZ) are modeled by evaluating the likelihood of RPBB movement across the surrounding vegetation cover classes through various habitat types. The model is based on the latest available National Land Cover Database and uses extant (i.e., sites where RPBB has been documented in 2007 or later) RPBB observations. The HPZ includes the areas within which the RPBBs would move from the point of observation to forage and where queens may be most likely to disperse and overwinter as predicted by species experts and other bumble bee literature. This model allows us to predict where the species may be found based on empirical information and scientific inferences as opposed to using a buffer of an arbitrary radius. The HPZs generated by the model suggest areas with the highest potential for the species to be present based on the location of one or more RPBB records, typical foraging distances, and inferred habitat suitability (<https://www.fws.gov/midwest/endangered/insects/rpbb/pdf/HabitatConnectivityModelRPBB.pdf>).

Segments S and T are not anticipated to have impacts to RPBB as the habitat does not appear to be suitable for the species where the proposed action area intersects with the HPZs. Suitable RPBB habitat is also anticipated to be impacted in a third HPZ located where the proposed transmission line terminates in Dane County, Wisconsin at Segment Y and Segment Z (Table 1).

Table 1. Route segments that intersect High Potential Zone for the RPBB.

High Potential Zone	Size of HPZ (km2)	RPBB detections	Suitable RPBB Habitat Impacted
Segment S HPZ	5.88	2017	No
Segment T HPZ	14.11	2018	No
Segment Y/Z HPZ	234.54	2019	Yes

Segment S HPZ

The proposed ROW crosses approximately 5.39 ha of unsuitable habitat on the edge of this HPZ and consists mainly of agricultural row-crop but may include some low quality grassland areas that represent a low likelihood of RPBB use. The project action area is located over 1.1 miles away from multiple 2017 RPBB observations.

Segment T HPZ

The proposed ROW crosses the edge of this HPZ through approximately 9.91 ha of unsuitable habitat (mostly agricultural row-crop) and approximately 1.91 ha of forested areas that appear to be of poor quality due to the proximity of established roads, ditches and agriculture. We anticipate the small amount of forested habitat impacted to have compacted soils, heavy understory and to cover such a small area that there is a low likelihood of overwintering use. The project action area is located over 1.2 miles away from multiple 2017/2018 RPBB observations.

Segment Y/Z HPZ

These two proposed routes are summarized collectively given their proximity to each other where they intersect the large HPZ that extends into the greater Madison area. Based on the Biological Assessment and desktop review of the land classification along the proposed ROW, we anticipate no more than 3.42 ha of low quality foraging habitat and no more than 10.22 ha of low to moderate quality overwintering habitat will be impacted by the proposed Project (Figure 4). Furthermore, we find it unlikely that nesting habitat would be present along the proposed ROW intersecting the Segment Y/Z HPZ.

The boundary for this HPZ has changed since the Biological Assessment was submitted, and was updated on March 25th, 2019 when new 2018 RPBB observations were incorporated into the model that were not available in previous versions. At the closest point to the proposed action area, RPBB were observed within 0.75 miles as recently as 2017. An updated model incorporating 2019 RPBB observations may modify the HPZ boundaries when it is run in March 2020. When this information becomes available, the updated map of HPZ locations will be available to the public at <https://www.fws.gov/midwest/endangered/insects/rpbb/rpbbmap.html>. The Service will send a letter with any additional concerns to RUS if new impacts to RPBB are anticipated based on the revised HPZ map.

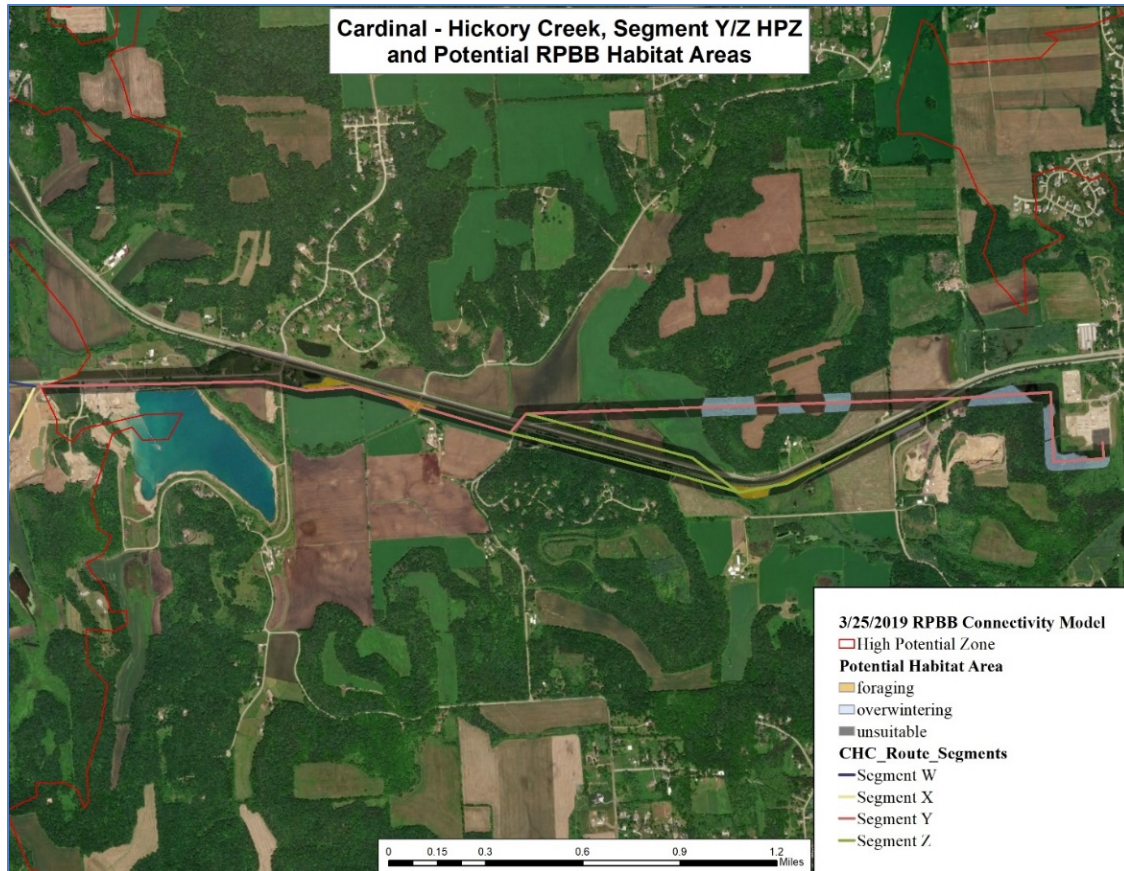


Figure 2. C-HC Segments Y/ Z ROW and 2019 RPBB High Potential Zone.

Due to uncertainty associated with some RPBB life history requirements, there is uncertainty regarding habitat use and distribution of the species during certain life stages and time periods. As a result, we make the following assumptions, based on the best available information, regarding RPBB distribution and habitat use:

- Average foraging distance for an individual RPBB is 0.8 km from a nest site. Worker foraging distances may extend 3 km from a nest in some species and circumstances (Lepais et al. 2010); however, foraging distances of less than 1 km from nests are typical (Knight et al. 2005, Wolf and Moritz 2008, Dramstad 1996, Osborne et al. 1999, Rao and Strange 2012).
- Status of colonies and the population in the HPZs are unknown at this time. However, we can assume that each 0.8km area surrounding RPBB observations signifies the existence of at least one colony.
- The RPBB observed within the HPZ which intersects with Segment Y and Segment Z represent at least 26 colonies, which is part of at least one population (multiple, interacting colonies) and at least 3 of those colonies are within 0.75 miles of the proposed action area.
- Overwintering queens are likely to be in proximity to spring ephemerals and may be found near woodland edges or in wooded areas with canopy openings that provide light to the forest floor in the spring.
- There are no studies that estimate RPBB nest density. Due to the uncertainty with

applying estimates derived for another species that is relatively common, we are using a range of assumed nest densities as opposed to a single estimate. The nest density most appropriate for evaluating a project may depend on the nature of the effects that a project is likely to cause. When assumptions of this nature are made within the context of section 7 consultation due to a lack of empirical information, we must give the benefit of the doubt to the species and therefore, provide a density range of low, moderate or high. Using this method, we anticipate a density of RPBB colonies in nesting habitat is estimated to be between 0.14 and 4.50 nests/ha for the following reasons:

- Multiple studies have been completed to estimate nest density for the buff-tailed bumblebee (*Bombus terrestris*), a close relative of the RPBB (Chapman et al. 2003 [as cited in Charman et al. 2010], Darvill et al. 2004, Knight et al. 2005, Kraus et al. 2009, Wolf et al. 2012, Dreier et al. 2014, Wood et al. 2015). Using the quartiles for ten density estimates for the buff-tailed bumblebee, we can better assume that RPBB nests may occur in nesting habitat at three densities: 14 nests/km² (low), 34 nests/km² (moderate), and 45 nests/km² (high).
- The estimated nest density found for one rare bumble bee species – the precipitously declining great yellow bumblebee (*B. distinguendus*) – was 19/km² in coastal grasslands and may indicate that our proposed assumptions for the rusty patched bumble bee are reasonable for an endangered species.
- To develop estimates of queen production for an HPZ we will use queen production data available from the yellow-banded bumble bee (*B. terricola*), another declining bumble bee species that is also closely related to the rusty patched bumble bee. These data include four lab-raised nests (Benjamin Sadd, Illinois State University, personal communication, 2018) and 32 field-reared nests studied by Owen et al. (1980). We estimate Low, Medium, and High levels of queen production based on the 25th, 50th, and 75th percentiles from their studies – these are 1, 4, and 10 queens per nest, respectively. The Low, Medium, and High assumptions are used for both nest density and queen production to structure an analysis to arrive at a range of estimates of queen production in an HPZ.

EFFECTS OF THE ACTION

Direct effects are the direct or immediate effects of the project on the species, its habitat, or designated/proposed critical habitat. Indirect effects are defined as those that are caused by the proposed action and are later in time, but still are reasonably certain to occur (50 CFR 402.02). An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. Direct and indirect effects of the proposed action along with the effects of interrelated/interdependent activities are all considered together as the “effects of the action.”

The potential effects of the proposed action are described in Appendix A. The project sub-activities unlikely to result in any impacts to RPBB or those that may affect, but are not likely to adversely affect are not discussed further in this Opinion. For some components of the proposed action that may adversely affect RPBB, AMMs have been incorporated to ameliorate those effects.

Considering the environmental baseline and the additional effects that may be caused by the Project, we believe that alteration of suitable habitat where the species is anticipated to be (Segment Y/Z HPZ) will have some beneficial effects, but also may represent an adverse effect to rusty patched bumble bee.

In the HPZ where suitable RPBB habitat is anticipated to be impacted, the proposed action is expected to include permanent loss of 10.22 ha of overwintering habitat, as well as temporary loss of 3.42 ha of foraging habitat (Table 2). The total amount of habitat available to RPBB is not anticipated to change since the applicant is proposing to revegetate any cleared natural ROW with a seed mix that would benefit RPBB. Therefore, overwintering habitat no longer available to RPBB is anticipated to provide foraging and possibly nesting opportunities for the species after restoration is complete. Soil compaction during ROW clearing and transmission line construction may affect the ability of queens to excavate an overwintering site and may reduce the ability of rodents to excavate burrows, which reduces the ability of colonies to find appropriate nest locations, resulting in reduced reproduction if this occurs in areas already suitable for nesting. Available habitat will be temporarily removed from approximately 14 ha of the action area for at least one growing season, and will remain unsuitable for approximately 77 ha.

Table 2. Habitat summary within ROWs where suitable RPBB habitat occur.

Habitat in Action Area	Segment Y/Z HPZ (Hectares)	Total Impacted (Hectares)
RPBB foraging only	3.42	3.42
RPBB nesting/foraging	0	0
RPBB overwintering	10.22	10.22
Unsuitable habitat	76.5	76.5

Beneficial Effects

Beneficial effects have been identified or are expected to occur for RPBB as a result of this project. The maintained ROW within impacted HPZs will be revegetated with a pollinator seed mix that will increase the forage and possibly, the nesting potential for each impacted HPZ. It is reasonable to assume that the increase of nesting and foraging habitat along the transmission line corridor will result in greater accessibility of RPBB to other suitable overwintering ground cover. In addition, this action is anticipated to increase sunlight on the forest floor that will temporarily promote spring ephemeral plant growth if the seed bank is sufficient, and facilitate dispersal to other suitable habitat areas within the HPZ.

Direct Effects

Within the HPZs, the sub-activities described in Appendix A may crush RPBBs, expose RPBBs to noise/vibration, and render habitat temporarily and permanently unsuitable. Seasonal timing of proposed actions have not yet been determined. For the purposes of this analysis, we will assume that all forested habitat suitable for RPBB overwintering will be removed at a time when queens will be present in the soil. In addition, we will assume that all suitable RPBB nesting and foraging habitat will be removed during the RPBB active season, at a time when colonies would be located underground or when worker bees would be foraging in the surrounding landscape. In reality, some construction activities will occur at a time where RPBB is not likely to present, and individuals would not be directly impacted by that portion of the proposed project. Therefore, the following analysis assumes a reasonable worst-case scenario, and actual impacts are expected to be less than estimated.

Foraging bees: Construction ROW activities (i.e. vegetation clearing) may occur in spring and summer foraging habitat where RPBB are present, but are not currently nesting in the ROW. Foraging bees are mobile, and are expected to be able to avoid direct impacts from construction activities. While construction activities are expected to temporarily reduce the quality of foraging habitat, it is expected that RPBB will be able to find other nearby foraging habitat. Once disturbed areas are restored, per the conservation measures, available foraging habitat is anticipated to increase in the affected HPZs. Individual RPBB may be exposed to noise/vibration, causing individuals to expend additional energy to seek out alternate foraging and nesting areas, which may reduce survival. A significant reduction in workers may affect the ability of the colony to obtain sufficient resources, resulting reduced reproductive capacity of the queen.

Nesting queens: Queens build a nest 1-3 feet underground in natural and semi-natural upland shrublands and grasslands with uncompacted soils, and along upland forest edges. Machinery used for vegetation removal and the placement of timber matting is expected to crush any colonies present within suitable nesting habitat in the action area of the HPZ and this would result in the loss of all individuals including the potential for new foundress queens that would establish new future colonies. This would result in lower reproductive success of the population. The proposed route for this project is not expected to impact suitable nesting habitat; therefore, no RPBB nests are anticipated to be impacted by this project.

Overwintering queens: Individual queens overwinter in leaf litter or a few centimeters underground in upland forests and woodlands. Timber harvest involves heavy machinery that can result in some rutting, scraping or compaction of soils. If forested areas are cleared during the RPBB inactive (overwintering) season between October 15 and March 15, RPBB queens present in the soil are expected to be crushed during vegetation removal. Loss of any overwintering queen present within the affected forested area would result in the loss of a future colony and a reduced reproductive capacity for the population within the HPZ.

Since we can estimate the assumed total queen production within HPZs, we can use the range of values to calculate the density of RPBB queens within the available overwintering habitat. Based on our calculations, RPBB queens may be present in forested habitat of Segment P HPZ #2 (an alternate route no longer considered) at a density ranging from 5 to 157 km². Since we were unable to calculate the total available habitat within Segment Y/Z HPZ, we will use the same range for our calculations of overwintering queen density as a reasonable worst-case scenario.

Using this assumption and the methods described in the Service's RPBB Section 7 Guidance document, we can approximate the number of overwintering queens that may be present within the impacted overwintering habitat. Approximately 10.22 ha (0.1022 km²) of suitable overwintering habitat will be impacted in Segment Y/Z HPZ (Table 2). Using these values, we estimate the number of overwintering queens present in the affected area to be up to 16 individuals in the HPZ, and is not anticipated to impact any nests directly based on the low quality of nesting habitat present. However, based on our desktop review and the habitat conditions described in the BA, we believe that is unlikely that the impacted overwintering habitat within Segment Y/Z HPZ can support queen densities at the highest range. The forested habitat described is anticipated to be of low to moderate quality, therefore we estimate that the realistic worst-case scenario for these HPZs would be that the project might impact up to 5 additional queens if construction activities occur at time when RPBB may be present in the affected area.

Based on our calculations and assumptions described above, we anticipate that approximately five overwintering queens may be impacted within the project area during construction activities (Table 3). These estimates utilize the best information we have about RPBB and information from related species.

While this is the best information available, it is incomplete and uncertain. Furthermore, these calculations assume the “reasonable worst case scenario” in relation to season of harvest, and assume that all ground within ROW will have ground disturbance from construction activities, and are therefore likely to be an overestimate of effects. Taking this into account, the overall reduction in numbers is not anticipated to significantly affect the species within the action area.

Table 3. Estimated range of individual RPBB present within proposed action areas.

Overwintering Queens in action area	Assumed RPBB queen estimate within Segment Y/Z HPZ		
	Low Density (1/nest)	Medium Density (4/nest)	High Density (10/nest)
Low (14 nests/km2)	0	2	5
Medium (34 nests/km2)	1	5	12
High 45 nests/km2)	2	6	16

Indirect Effects

Construction activities within the proposed ROW corridors may facilitate the spread of invasive plant species and allow them to become more established within RPBB HPZ. Suitable overwintering, nesting or foraging habitat adjacent to the action area may indirectly be affected if invasive species become established and encroach into other natural habitat types. However, this will be minimized by the use of BMPs to limit the spread of invasive plant species as well as by reseeding the affected areas with a suitable seed mix.

Soil compaction during site access and transmission line placement may also reduce the ability of rodents to excavate burrows, which reduces the ability of colonies to find appropriate nest locations, resulting in reduced reproduction.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. At this time, we are unaware of any new private or state actions anticipated to occur within the Action Areas, so no significant cumulative effects are anticipated.

Analysis for Jeopardy

Section 7(a)(2) of the ESA requires that federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat.

“Jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). The following analysis relies on four components: (1) Status of the Species, (2) Environmental Baseline, (3) Effects of the Action, and (4) Cumulative Effects. The jeopardy analysis in this Opinion emphasizes the rangewide survival and recovery needs of the listed species and the role of the action area in providing for those needs. It is within this context that we evaluate the significance of the proposed federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Impacts to Individuals – As discussed in the Effects of the Action, anticipated effects of the action include effects to individual RPBBs present within the HPZ year-round. Effects will include reduced reproductive success of some queens because of removal of spring ephemerals and other floral resources, and injury or death of individual workers or queens during the active and overwintering season related to crushing by machinery during construction in the proposed ROW.

In response to removal of floral resources, the following season RPBB workers and early foraging queens will have less foraging habitat available to them, are likely to expend more energy to forage elsewhere within the foraging range of nests, and may experience reduced health as a result of the decrease in food availability. Consequently, there will be impacts to health of those individual RPBB workers that would have utilized previously available foraging habitat.

Individual worker bees are responsible for supporting the reproductive success of the colony by providing food resources to the queen. The health of the colony is dependent on the number of workers foraging and providing resources and on the abundance of foraging habitat. Reduced health of RPBB workers will reduce the reproductive success of some queens (i.e., not as many males and foundress queens produced) as a result of loss of foraging resources provided by workers. Furthermore, the loss of reproductive individuals may reduce the success of future matings and the success of future colonies. When related individuals mate, there is a higher likelihood of colony collapse associated with haplodiploidy, when 50 percent of the workers are replaced by diploid males that do not contribute food resources to the colony (82 FR 3186-3209).

Overwintering queens may be found within the action area of the proposed project. Vegetation removal and construction activities will occur on approximately 10 ha of potentially suitable overwintering habitat. Within the available overwintering habitat of Segment P HPZ #2 (1,463 ha), an alternative route no longer considered, the proposed action may have impacted 35.68 ha (2.4%) of potentially suitable overwintering habitat. We considered this a small percentage of the total available habitat to the species. Although the total available habitat was not calculated for Segment Y/Z HPZ, the percentage of habitat lost for this area is expected to be less than 2.4%. Therefore, a 2.4% reduction of the available suitable overwintering habitat may effect approximately 2% total overwintering queens in the HPZ if construction occurs at a time they are present.

Impacts to Populations – As we have concluded that some individual RPBBs are likely to be killed or experience some reductions in health, and colonies may experience some reductions in their reproductive success, we need to assess the aggregated consequences of the anticipated losses and reductions in fitness (i.e., reproductive success and long-term viability) of the exposed individuals and colonies on the population to which these belong.

A population of RPBB is represented by the number of successful nests or colonies in a given geographical area, rather than a number of individuals, because a colony is founded by a single queen and represents one reproductive unit (Chapman and Burke 2001, Zayed 2009, Service 2016). As a result of their genetic structure, a RPBB population can only persist on the landscape in a metapopulation structure (a group of spatially separated populations, which in this case are colonies, of the same species that interact at some level). A healthy population typically contains many colonies, and loss of a colony or overwintering queen could reduce the overall viability of any metapopulation associated with those colonies due to lost opportunities to interbreed and small population dynamics. Impacts to populations may result from loss of a colony nest through crushing, crushing overwintering foundress queens, or loss of a percentage of colony workers.

Reduced foraging of workers may decrease the reproductive success of colonies as a result of loss of foraging resources provided by workers to the queen (i.e., not as many foundress queens produced to start new colonies). The proposed action will remove foraging habitat. For RPBBs not nesting in the impacted ROW there may be less floral resources available to them in this area. In addition, approximately 3.42 ha of low to moderate quality foraging habitat occurs within the impacted HPZs. Although total available habitat has not been calculated, we believe the temporary loss of this floral habitat in these areas represent a small percentage and significance to the total available habitat for the species. After project and restoration activities are complete, an increase of approximately 50 ha of floral resources is anticipated within the established ROW.

Impacts to Species – The species is made up of many populations - Since 2007, RPBB has been reported from 10 states and 1 Canadian province and more recently has been reported from 6 states (in the past five years). While RPBB has experience a reduction rangewide, the number of known sites in the two states associated with this action have increased and are distributed across a larger area. As we have concluded that populations of RPBB are unlikely to experience reductions in their fitness, there will be no harmful effects (i.e., there will be no reduction in RND) on the species as a whole.

CONCLUSION

We considered the current overall declining status of the RPBB and the inferred condition of the species within the action area (environmental baseline). We then assessed the effects of the proposed action and the potential for cumulative effects in the action area on individuals, the affected population, and the species as a whole. As stated in the Jeopardy Analysis, we do not anticipate any reductions in the overall RND of the RPBB. It is the Service's Opinion that the authorization to construct and operate the Cardinal – Hickory Creek 345-kV Transmission Line, as proposed, is not likely to jeopardize the continued existence of the rusty patched bumble bee. No critical habitat has been designated for this species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to Section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering (50 CFR § 17.3). Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering (50 CFR § 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken by RUS so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in Section 7(o)(2) to apply. The RUS has a continuing duty to regulate the activity covered by this incidental take statement. If the RUS: (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of Section 7(o)(2) may lapse. To monitor the impact of incidental take, the RUS, or the applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR 402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE ANTICIPATED

It is appropriate to use surrogates to describe the anticipated extent of incidental in incidental take statements (ITS) as long as 1) the ITS describes the causal link between the surrogate and the take of the listed species; 2) the ITS describes why it is not practical to express the amount or extent of anticipated take or to monitor take-related impacts in terms of individuals of the listed species; and, 3) the ITS sets a clear standard for determining when the level of anticipated take of the listed species has been exceeded.

Causal Link Between Surrogate and Take of Species – This ITS uses hectares of RPBB habitat as a surrogate to express the extent of authorized take for the RPBB because it is not practical to monitor take related impacts in terms of individuals of the species. Since it will be difficult to measure the effects of habitat loss on individuals, take will be expressed in terms of the area of habitat removed.

Numeric Estimate of Anticipated Incidental Take/Monitoring of Take-Related Impacts – It is not practical to estimate or monitor the total number of workers and queen RPBBs that may be killed or harmed as a result of the proposed action. While well informed worst cases scenarios are helpful in conducting jeopardy analysis (see above), no method exists to accurately determine the specific number of individual bees anticipated to be taken by this project. In addition, the Service anticipates incidental take of RPBB will be difficult to detect for the following reasons: species has small body size, losses may be masked by seasonal fluctuations in numbers and other environmental factors, and species occurs in habitat (i.e., underground) that makes detection difficult.

Clear Standard for Determining the Exceedance of Anticipated Take – Since the detection of individuals taken by the proposed action is not feasible, measure the quantity of habitat impacted provides a clear standard that does not change substantially over time for this species.

Summarized in the table below, the level of take of this species is not anticipated to exceed 3.42 ha of foraging habitat and 10.22 ha of forested overwintering habitat within the project action area of the currently mapped HPZs. The total area encompasses where ground disturbance, including vegetation clearing, along the construction ROW and access roads will occur within RPBB occupied suitable habitat.

Table 4. Amount and type of anticipated incidental take.

Species	Amount of Take Anticipated	Life Stage when Take is Anticipated	Type of Take	Take is Anticipated as a Result of
RPBB	Small percent of individuals present within 3.42 ha of foraging habitat	Adult workers, males, or queen	Harm or Harass	Temporary reduced reproduction associated with loss or alteration of foraging habitat.
RPBB	Small percent of individuals present within 10.22 ha of overwintering habitat	Overwintering and foraging queens	Kill	Crushing due to vegetation clearing and construction activities.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measure(s) are necessary and appropriate to minimize take of RPBB:

- Minimize pre-construction vegetation clearing and ground disturbance.
- Use native species in restoration activities
- Maintain suitable habitat within the permanent ROW
- Document and report to the Service the timing and extent of disturbances within suitable habitat for RPBB to help inform future consultations.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of Section 9 of the ESA, the RUS or the applicant must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. Minimize clearing, grading, and vegetation removal within suitable habitat areas of HPZs.
2. Re-seed all construction ROW areas (temporary and permanent) within the existing suitable

habitat areas of the HPZs with pollinator friendly native seed mixes consistent with recommendations provided by the Service. When possible, include species preferred by RPBB and ensure that some plants are in bloom throughout the season when RPBB may be present. Preferred list is available at: <https://www.fws.gov/midwest/Endangered/insects/rpbb/plants.html>

3. Provide a written summary of the suitable habitat impacted, the timing of impact as it pertains to the RPBB active and inactive season, and the estimated percentage of disturbed ground at the completion of transmission line construction and other associated activities.

The reasonable and prudent measures, with implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. With implementation of these reasonable and prudent measures, the Service believes that no more than 5.65 ha of nesting habitat, 3.42 ha of additional foraging habitat and 49.95 ha of overwintering habitat suitable for RPBB will be modified as a result of the proposed actions. If, during the course of the action, this minimized level of incidental take is exceeded, such incidental take represents new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

MONITORING AND REPORTING REQUIREMENTS

Federal agencies have a continuing duty to monitor the impacts of incidental take resulting from their activities [50 CFR 402.14(i)(3)]. In doing so, the Federal agency must report the progress of the action and its impact on the species to the Service as specified below.

1. Prior to initiation of vegetation clearing in the HPZs provide to the Minnesota-Wisconsin Field Office, at the email address below, the limits of equipment, vehicle traffic and staging, and the methods used to ensure that construction activities will not exceed these limits.
2. RUS or applicant shall notify the Service regarding the projected and actual start dates, progress, and completion of the project and verify that the 5.65 ha of nesting habitat, 3.42 ha of additional foraging habitat and 49.95 ha of clearing was not exceeded and all conservation measures were followed. Provide a report that includes the total acreage of RPBB habitat removed within mapped HPZs as it relates to the species' life history (i.e. active season, March 15 to October 15 or inactive season, October 15 to March 15) by December 31 of each year until construction is complete to the Minnesota-Wisconsin Field Office at the address listed below.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

- Improve pollinator habitat by planting within unsuitable habitat areas of the ROW within mapped HPZs. Providing additional habitat adjacent to currently suitable habitat areas will benefit the local RPBB colonies and facilitate dispersal.
- Improve pollinator habitat by planting outside of the currently mapped HPZs, specifically in the

eastern portion of the proposed route between Segment P HPZ #2 and Segment Y/Z HPZ. Providing additional habitat between HPZs will benefit the species and will help reach recovery goals.

- Improve pollinator habitat throughout the project area by using pollinator friendly native seed mixes. Include species preferred by RPBB, list available at: <https://www.fws.gov/midwest/endangered/insects/rpbb/plants.html>.

For the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action(s) outlined in the request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions regarding this Opinion or our shared responsibilities under the ESA, please contact Dawn Marsh at 952-252-0092 ext. 202 or at dawn_marsh@fws.gov.

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Appendix A. RPBB Effects Table

Table is color coded as follows:

- NE rows are light green
- NLAA rows are light yellow
- LAA are light red

Table 1. Analysis of effects on RPBB.

Transmission Line Activity	Subactivity	Environmental Impact or Threat	Stressor	Stressor Pathway (optional)	Exposure (Resource Affected)	Range of Response	Conservation Need Affected	Demographic Consequences	NE, NLA, or LAA	Comments
New Disturbance - Construction	Vehicle Operation and Foot Traffic	human activity & disturbance	decreased foraging; crushing colonies or overwintering queens	human presence	all life stages	Kill, harm, harass	breeding, feeding, sheltering	numbers, reproduction	LAA	Vehicle operation off established roads may crush RPBB individuals. There is no evidence that vehicle operation at low speeds on established roads would impact individual RPBB. Foot traffic is not expected to crush RPBB.
New Disturbance - Construction	Clearing - herbaceous vegetation and ground cover	clearing of floral habitat; human activity & disturbance	alteration of summer foraging habitat, & colony habitat; decreased foraging efficiency; crushing individuals, colonies or overwintering queens	vegetation removal; human presence	all life stages	kill, harm, harass	breeding, feeding, sheltering	numbers, reproduction	LAA	Clearing of herbaceous vegetation while RPBB are present in habitat is expected to have a direct effect on the quality, quantity, and timing of floral resources, thereby reducing survivability and reproductive success of queens; equipment used could crush individuals, queens or colonies. AMMs are anticipated to minimize or avoid direct RPBB impacts for portions of the proposed project.
New Disturbance - Construction	Clearing - trees and shrubs	clearing of foraging habitat; human activity & disturbance	alteration of summer foraging habitat, & colony habitat; decreased foraging efficiency; crushing individuals, colonies or overwintering queens	vegetation removal; human presence	all life stages	kill, harm, harass	breeding, sheltering	numbers, reproduction	LAA	Clearing of trees and shrubs while RPBB are present in habitat is expected to have a direct effect on the quality, quantity, and timing of floral resources, thereby reducing survivability and reproductive success of queens; equipment used could crush individuals, queens or colonies. AMMs are anticipated to minimize or avoid direct RPBB impacts for portions of the proposed project.
New Disturbance - Construction	Vegetation Disposal (upland) - dragging, chipping, hauling, piling, stacking	human activity & disturbance	alteration of summer foraging habitat, & colony habitat; decreased foraging & travel efficiency; crushing individuals in colonies or overwintering	vegetation removal; human presence	all life stages	kill, harm, harass	breeding, feeding, sheltering	numbers, reproduction	LAA	Vegetation disposal may crush foraging individuals.
New Disturbance - Construction	Vegetation Disposal (upland) - brush pile burning	human activity & disturbance; smoke	decreased foraging	smoke; human presence & noise	all life stages	none expected	NA	NA	NLAA	Smoke inhalation may agitate bees but response is not expected to be detrimental.
New Disturbance - Construction	Vegetation Clearing - tree side trimming by bucket truck or helicopter	No side trimming occurs for new construction.	NA	NA	NA	NA	NA	NA	NE	NA
New Disturbance - Construction	Grading, erosion control devices	alteration of water flow; vegetation removal; human activity	alteration of foraging habitat	vegetation removal; human presence	all life stages	kill, harm, harass	breeding, feeding, sheltering	numbers, reproduction	LAA	Construction associated with grading and erosion control devices could crush foraging individuals if conducted in HPZ.
New Disturbance - Construction	Regrading and Stabilization - restoration of corridor	human activity & disturbance	Removal of foraging vegetation and nesting habitat; crushing of individuals	habitat disturbance, human presence & noise	all life stages	kill, harm, harass	breeding, feeding, sheltering	numbers, reproduction	LAA	Construction associated with this activity could crush foraging individuals if conducted in HPZ.
New Disturbance - Construction	Access Roads - upgrading existing roads, new roads temp and permanent-grading, graveling	alteration of surface water flow; vegetation removal; human activity	Removal of foraging vegetation and nesting habitat; crushing of individuals in colonies or overwintering	removal of foraging habitat	all life stages	kill, harm, harass	breeding, feeding, sheltering	numbers, reproduction	LAA	Construction associated with this activity could crush foraging individuals if conducted in HPZ.
New Disturbance - Construction	Access Roads - upgrading existing roads, new roads temp and permanent-culvert installation	tree removal; loss or alteration of forested habitat; human disturbance	Removal of foraging vegetation and nesting habitat; crushing of individuals in colonies or overwintering	vegetation removal; human presence	all life stages	kill, harm, harass	breeding, feeding, sheltering	numbers, reproduction	LAA	Construction associated with this activity could crush foraging individuals if conducted in HPZ.
New Disturbance - Construction	Access Roads - upgrading existing roads, new roads temp and permanent- tree trimming and tree removal	tree removal; loss or alteration of forested habitat; human disturbance	Removal of foraging vegetation and nesting habitat; crushing of individuals in colonies or overwintering	vegetation removal; human presence	all life stages	kill, harm, harass	breeding, feeding, sheltering	numbers, reproduction	LAA	Tree removal could crush foraging individuals.
New Disturbance - Construction	Access Roads - place timber matting in ROW	human activity & disturbance	alteration of colony and overwintering habitat; decreased foraging & travel efficiency; crushing individuals in colonies or overwintering	vegetation removal; human presence	all life stages	kill, harm, harass	breeding, feeding, sheltering	numbers, reproduction	LAA	Placement of timber matting will compact soils could crush foraging individuals if conducted in HPZ. AMMs are anticipated to minimize or avoid direct RPBB impacts for portions of the proposed project.
New Disturbance - Construction	Install footings and support posts	loss or alteration of habitat; increased human activity/disturbance	alteration of summer foraging habitat, & colony habitat; decreased foraging & travel efficiency; crushing individuals in colonies or overwintering	vegetation removal; human presence	all life stages	kill, harm, harass	breeding, feeding, sheltering	numbers, reproduction	LAA	Construction associated with this activity could crush foraging individuals if conducted in HPZ.
New Disturbance - Construction	Crossings, wetlands and other water bodies (non-riparian) - clearing	RPBB not present	NA	NA	NA	NA	NA	NA	NE	NA
New Disturbance - Construction	Crossings, wetlands and other water bodies (non-riparian) - tree side trimming	No side trimming occurs for new construction.	NA	NA	NA	NA	NA	NA	NE	NA
New Disturbance - Construction	Crossings, wetlands and other water bodies (non-riparian) - grading	RPBB not present	NA	NA	NA	NA	NA	NA	NE	NA
Operation & Maintenance	Facilities - vehicles, foot traffic, noise, transmission facilities	increased human activity/disturbance	decreased foraging efficiency; crushing individuals	human presence; vehicle traffic	all life stages	Kill, harm, harass	breeding, feeding	numbers, reproduction	LAA	Vehicle traffic may crush RPBB foraging along roadsides. Traffic may disrupt foraging behavior and displace individual RPBBs.
Operation & Maintenance	Vegetation Management - mowing	loss or alteration of forested habitat; increased human activity/disturbance;	decreased foraging efficiency;	vegetation removal	all life stages	none expected	NA	NA	NLAA	Mowing may reduce RPBB foraging resources, alteration of habitat, mowing blades may crush RPBB. Conservation measure to maintain a minimum blade height of 10 inches during maintenance of the ROW should significantly reduce the likelihood of impacts from crushing.
Operation & Maintenance	Vegetation Management - chainsaw and tree clearing	loss or alteration of foraging habitat; increased human activity/disturbance	alteration of summer foraging habitat, & nesting habitat; kill or injure overwintering queens	vegetation removal; human disturbance	all life stages	Kill, harm, harass	breeding, feeding, sheltering	numbers, reproduction	LAA	Vegetation alterations to foraging habitat should be small. Tree felling and heavy equipment may crush foraging individuals.
Operation & Maintenance	Vegetation Management - herbicides - hand, vehicle mounted, aerial applications	chemical contamination; vegetation loss; loss of floral habitat	lethal or sublethal exposure to toxins; alteration of travel corridors, summer foraging habitat	contamination of water & vegetation; loss of foraging vegetation (e.g. rhododendrons and woody flowering shrubs)	all life stages	none expected	NA	NA	NLAA	AMMs to avoid aerial or broadcast pesticide and herbicide application. Use of targeted spot-spraying or wiping, or mechanical pulling to target invasive and noxious weeds.
Operation & Maintenance	Vegetation Disposal (upland) - dragging, chipping, hauling, piling, stacking	human activity & disturbance; obstructed nest entrances	loss or alteration of nesting, overwintering habitat	vegetation removal; human disturbance	all life stages	kill, harm, harass	breeding, sheltering	numbers, reproduction	LAA	Vegetation disposal may crush individuals.

Transmission Line Activity	Subactivity	Environmental Impact or Threat	Stressor	Stressor Pathway (optional)	Exposure (Resource Affected)	Range of Response	Conservation Need Affected	Demographic Consequences	NE, NLAA, of LAA	Comments	
Operation & Maintenance	Vegetation Disposal (upland) - brush pile burning	human activity & disturbance; smoke disturbance	smoke inhalation	smoke in foraging or nesting habitat	all life stages	none expected	NA	NA	NA	NLAA	Response of RPBBs to smoke is not expected to be detrimental.
Operation & Maintenance	Vegetation Management - tree side trimming by bucket truck or helicopter	loss or alteration of foraging habitat; human disturbance; compaction of soil	alteration of foraging habitat; alteration of nesting and overwintering habitat	vegetation removal; human disturbance	unlikely	none expected	NA	NA	NA	NLAA	AMMs minimize potential effects; vegetation alterations to foraging habitat should be small. Noise and activity levels are anticipated to be low with no disturbance to colonies. Although some foraging habitat may be altered, we do not expect indirect effects to occur because the majority of habitat will not be altered. Trimming may result in increased light to the forest floor, creating opportunity for increased floral resources. Effects are expected to be insignificant.
Operation & Maintenance	ROW repair, regrading, revegetation (upland) - hand, mechanical	tree removal; loss or alteration of floral resources and forested habitat; human disturbance	alteration of summer foraging habitat, & colony habitat; crushing of colonies & overwintering queens	vegetation removal; human disturbance	all life stages	Kill, harm, harass	breeding, feeding, sheltering	numbers, reproduction	LAA	ROW repairs occur in areas of soil erosion where floral resources may be of higher quality. ROW repairs may remove nesting habitat, or crush individuals.	
Operation & Maintenance	ROW repair, regrading, revegetation (wetland) - hand, mechanical	tree removal; loss or alteration of forested habitat; human disturbance	alteration of summer foraging habitat	vegetation removal; human disturbance	all life stages	none expected	NA	NA	NA	NLAA	The small area and level of impact from these activities is not expected to have noticeable or measurable impacts on RPBB or their foraging habitat.
Operation & Maintenance	ROW repair, regrading, revegetation - in stream stabilization and/or fill	tree removal; loss or alteration of forested habitat; human disturbance	alteration of summer foraging habitat	vegetation removal; human disturbance	unlikely	none expected	NA	NA	NA	NLAA	The small area and level of impact from these activities is not expected to have noticeable or measurable impacts on RPBB or their habitat.
Operation & Maintenance	Access Road Maintenance - grading, graveling	removal; loss or alteration of floral habitat; human disturbance	alteration of summer foraging habitat, & colony habitat; crushing of colonies & overwintering queens	vegetation removal; human disturbance	all life stages	kill, harm, harass	feeding, breeding, sheltering	numbers, reproduction	LAA	Vegetation alterations will remove high quality foraging habitat, impacting survival and reproduction. Activities could crush individuals.	
Operation & Maintenance	Access Road Maintenance - culvert replacement	tree removal; loss or alteration of floral habitat; human disturbance	alteration of summer foraging habitat, & colony habitat; crushing of colonies & overwintering queens	vegetation removal; human presence	all life stages	none expected	NA	NA	NA	NLAA	The small area and level of impact from these activities is not expected to have noticeable or measurable impacts on RPBB or their habitat.