Spruce Grouse (*Falcipennis canadensis*) Species Guidance

Family: Phasianidae – the partridges, grouse, turkeys, and Old World quail

State Status: Threatened (1997)

State Rank: S1S2B, S1S2N

Federal Status: None

Global Rank: G5

Wildlife Action Plan Mean Risk Score: 2.6

Wildlife Action Plan Area Importance Score: 2

Counties with documented locations of Spruce Grouse breeding and breeding evidence in Wisconsin. Source: Natural Heritage Inventory Database, October 2018.

Photo by Ray White

Species Information

General Description: The Spruce Grouse is a compact grouse approximately 41cm (16 in) long. Males have gray-brown upperparts and wings with blackish barring, and a dark tail with a pale rufous terminal band. Underparts are black with white edging on breast, belly, and undertail coverts. Males have distinctive red eye combs that are erected during displays. Females can show thin red eye combs, have mottled gray-brown to red-brown upperparts, strongly barred and white-tipped underparts, and a banded tail with a pale rufous terminal band (Boag and Schroeder 1992, Sibley 2000, Williamson et al. 2008).

Spruce Grouse produce a variety of fairly quiet non-vocal hissing, thumping, and whirring sounds by rapidly beating their wings, striking their bills against solid objects, stomping their feet, and fanning their tails. Females also give a series of long, rolling clucks, known as the *cantus*. An example of a display flight sound can be heard here: <http://www.allaboutbirds.org/guide/Spruce_Grouse/sounds>

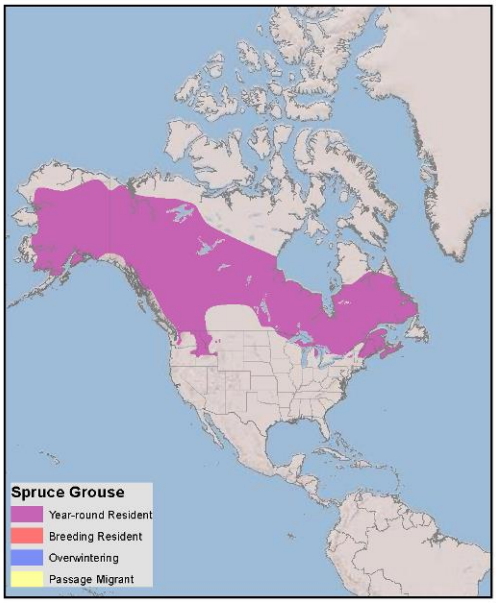
Definitive Identification: Male Spruce Grouse are distinctively patterned, and easily distinguished from other grouse. The banded tail with pale rufous terminal band helps to distinguish female Spruce Grouse from other grouse (Boag and Schroeder 1992).

Similar Species: Female Spruce Grouse resemble female Ruffed Grouse (*Bonasa umbellus*) but have more defined horizontal barring on the breast and can be distinguished by tail patterns. Female Spruce Grouse have a pale rufous terminal band on the tail, whereas female Ruffed Grouse have a dark subterminal band. Additionally, Spruce Grouse do not erect their crown feathers, as do Ruffed Grouse when alarmed (Boag and Schroeder 1992).

Associated Species: Within appropriate coniferous forest types, Spruce Grouse could occur with the following Species of Greatest Conservation Need: Northern Goshawk (*Accipiter gentilis*), Black-backed Woodpecker (*Picoides arcticus*), Olive-sided Flycatcher (*Contopus cooperi*), Boreal Chickadee (*Poecile hudsonica*), Connecticut Warbler (*Oporornis agilis*), Canada Warbler (*Cardellina canadensis*), and Red Crossbill (*Loxia curvirostra*).

State Distribution and Abundance: The Spruce Grouse is an uncommon resident of northern Wisconsin and is generally limited to the northernmost two tiers of counties. Highest concentrations of this species are clustered in six counties: Sawyer, Ashland, Iron, Oneida, Vilas, and Forest (Worland et al. 2009). Distribution information for this species may not reflect its full extent in Wisconsin because many areas of the state have not been thoroughly surveyed.

Global Distribution and Abundance: The Spruce Grouse's range extends eastward from Alaska to Labrador, and south into Washington, Idaho, eastern Montana, central Saskatchewan, southeastern Manitoba, northeastern Minnesota, northern Wisconsin,

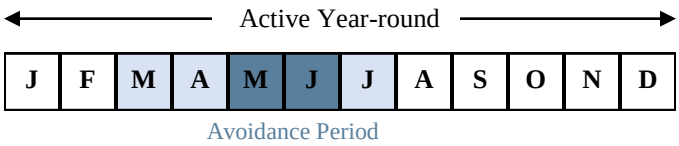


Global range map for Spruce Grouse. (NatureServe 2013)

northern Michigan, southern Ontario, southern Quebec, northern New Hampshire, southern Maine, New Brunswick, and Nova Scotia (Boag and Schroeder 1992). Within this range, highest densities occur in Quebec, Ontario, and the Northwest Territories (Williamson et al. 2008).

Diet: The Spruce Grouse consumes bearberries (*Arctostaphylos uva-ursi*), bunchberries (*Cornus canadensis*), spruce (*Picea* spp.), pine (*Pinus* spp.), fir (*Abies* spp.), and tamarack (*Larix laricina*) needles, white birch (*Betula* spp.) buds, blueberry (*Vaccinium* spp.) leaves and fruit, wood fern (*Dryopteris* spp.), sedges, mosses, mushrooms, and insects. During winter, its diet consists of nearly 100% conifer needles (WDNR 2005).

Reproductive Cycle: Male Spruce Grouse conduct courtship displays in Wisconsin from late February to early May. Dates for nests with eggs range from May 4 to July 1 (N. Anich pers. comm.). Young depart the nest shortly after hatching and are able to feed on their own. First flight occurs at approximately six to eight days, but chicks remain with the hen until they are approximately 70-100 days old (Boag and Schroeder 1992).



Ecology: The Spruce Grouse diet consists primarily of conifer needles, especially during the winter months. Short-needled pine such as jack pine (*Pinus banksiana*) is preferred over spruce, and white spruce (*Picea glauca*), where available, is favored over black spruce (*Picea mariana*; Boag and Schroeder 1992, Williamson et al. 2008). Foraging in conifers typically occurs at mid-crown level, possibly because those branches provide better support and concealment (Boag and Schroeder 1992). During the spring and summer months, Spruce Grouse also forage on the ground for mushrooms, small arthropods, and a variety of ericaceous plants (Pietz and Tester 1982, Boag and Schroeder 1992).

Males perform courtship displays during the breeding season. The flutter-flight display involves the male flying upwards into a tree and then descending rapidly. At the end of the descent, approximately one to two meters above the ground, the male swings his body into a vertical position, spreads his tail, and rapidly beats his wings (Lumsden 1961). The tail-swish, tail-flick, and head-jerk displays are performed in the presence of a female and involve the male erecting his plumage, inflating his red eye combs, drooping his wings, and bobbing his head (Boag and Schroeder 1992).

Nests are simple depressions in the ground lined with conifer needles, leaves, and feathers. The female selects a nest site that is often well concealed with low branches and located in areas with dense herb-shrub layers (Boag and Schroder 1992, Williamson et al. 2008). In Wisconsin, female Spruce Grouse frequently nest at the base of black spruce amongst a thick ground layer of Labrador tea (*Rhododendron groenlandicum*), cotton grass (*Eriophorum* sp.), leatherleaf (*Chamaedaphne calyculata*), and sedges (Worland et al. 2009). Females nest less commonly at the base of tamarack, balsam fir (*Abies balsamea*), and jack pine (N. Anich pers. comm.). Spruce Grouse elsewhere in their range nest at the base of white spruce and lodgepole pine (*Pinus contorta*), as well as under willows (*Salix* spp.) or logs (Boag and Schroeder 1992). Female Spruce Grouse in Wisconsin lay and incubate 3-8 eggs, with a mean clutch size of 6.3 (N. Anich pers. comm.). Incubation lasts 21-24 days, and chicks leave the nest approximately eight hours after hatching (Baicich and Harrison1997). This species is single brooded but may re-nest if the first clutch fails (Storch 2007).

Natural Community Associations (WDNR 2005, WDNR 2009):
Significant: northern wet forest, black spruce swamp, muskeg, pine barrens
Moderate: boreal forest, northern dry forest, open bog, tamarack swamp
Minimal: none

Habitat: Black and white spruce, tamarack, and jack pine are important tree species for Spruce Grouse in Wisconsin (N. Anich pers. comm.). This species appears to avoid conifer stands with a significant deciduous component, particularly white birch (*Betula papyrifera*) or aspen (*Populus* spp.) (Schroeder and Boag 1991, Worland et al. 2009). Spruce Grouse in Wisconsin often occupy the edges of upland and lowland coniferous forests, especially mature (>90 years) black spruce-tamarack forest adjacent to young (<30 years) successional stands of upland spruce, jack pine, or red pine (*Pinus resinosa*) (Worland et al. 2009). Within most forest types, this species prefers dense stands (1000-1400 stems/acre; 2500-3500 stems/ha).

Structural complexity of forest layers is also a key component of Spruce Grouse habitat. Spruce Grouse use the different vertical strata of a forest to fulfill different seasonal and behavioral requirements (Harrison 2001). During the breeding season, for example, females occupy areas with a dense herb-shrub layer, whereas males prefer sites with less shrub cover. Males choose territories with moderate to high tree density and canopy cover, whereas females with broods prefer a more open forest canopy (Boag and Schroeder 1992, Williamson et al. 2008). One study in New York found that the density of live foliar coverage in the 1-4m (3-13 ft) stratum was

greater in forests occupied by Spruce Grouse than in unoccupied forests (Ross 2007). Elsewhere in their range, this species requires trees that are branched between 4-8m (13-26 ft) above ground (Williamson et al. 2008).



Left and middle photos: Spruce Grouse habitat in wetlands dominated by black spruce (*Picea mariana*), Nicholas Anich, Wisconsin DNR. Right photo: nest located in *Sphagnum* sp. moss under a black spruce sapling with the ericaceous shrub Labrador tea (*Ledum groenlandicum*) in the foreground. Karl Martin, Wisconsin DNR

Threats: A significant threat to Spruce Grouse in Wisconsin is the conversion of coniferous stands to deciduous or mixed deciduous-coniferous stands (Worland et al. 2009). In particular, conversion of upland jack pine or spruce to other types, or conversion of quality black spruce-tamarack to northern white-cedar (*Thuja occidentalis*) or alder (*Alnus* spp.) would be detrimental. Recurring insect and disease problems (i.e., spruce and jack pine budworm) may have significant negative effects on conifer habitat. Fragmentation of existing, high-quality habitat limits dispersal between sites and may result in higher extinction rates of small populations (Harrison 2001, Ross 2007), such as those found in Wisconsin.

Climate Change Impacts: This species is vulnerable to extirpation from the state. In Wisconsin, the warmer, drier conditions predicted by climate change models will result in regeneration failure – as well as seedling and adult mortality – of nearly all tree species favored by Spruce Grouse (see "Habitat" section; Swanston et al. 2011, WICCI 2011, Swanston et al. 2012). Tamarack lowlands are particularly at risk because they persist at the southern extent of the tamarack's continental range and are sensitive to reductions in insulating snow cover that can allow tamarack root systems to freeze (WICCI 2011). Many boreal forest species are expected to shift their range northward out of Wisconsin (WICCI 2011). Based on these projections, Spruce Grouse would be expected to exhibit a northward distribution shift due to changes in structure and availability of lowland conifer forest types (Scheller and Mladenoff 2005, Williamson et al. 2008, WICCI 2011). Climate change adaptation efforts to identify and manage key tamarack swamps and other key sites for drought resistance (see *Management Guidelines*) may help retain these species in Wisconsin.

Survey Guidelines: Persons handling Spruce Grouse must possess a valid Endangered and Threatened Species Permit. If surveys are being conducted for regulatory purposes, survey protocols and surveyor qualifications must first be approved by the Endangered Resources Review Program (see *Contact Information*). Call playback surveys are an effective technique for surveying Spruce Grouse. Survey the entire affected area that contains suitable habitat for Spruce Grouse (see "Habitat" section) by standing at a survey station for 5 minutes and broadcasting a taped recording of the female's long, cackling "cantus" call. Broadcast the recording for 30 seconds at the beginning of the survey, follow with 2 minutes of silent observation, and then repeat the sequence (Worland et al. 2009). Locate survey stations between upland and lowland coniferous stands or in the interior of conifer swamps and place them a minimum of 100 m (328 ft) apart. **This species is more likely to be heard than seen.** Listen carefully for male flutter flights, which sound like a large bird softly flapping, and do not carry as well as Ruffed Grouse drumming. Record the following data: all Spruce Grouse seen or heard, behavioral observations such as courtship displays, and other Species of Greatest Conservation Need that are present at the site.

Carry out surveys between April 1 and May 15, preferably 10 days apart, and including at least one survey less than one week before any proposed project activity that may impact Spruce Grouse (see *Screening Procedures*). Begin surveys within 15 minutes of sunrise and complete them within 4 hours, or no later than 10 am. Conduct surveys during appropriate weather (i.e., no fog, rain, or wind >10 mph). Personnel conducting surveys must be able to identify Spruce Grouse by sight and sound. At least three surveys conducted with the above protocol and yielding negative results are needed to determine that the species is not present at a site for the purposes of these guidelines.

Summarize results, including survey dates, times, weather conditions, number of detections, detection locations, and behavioral data and submit via the WDNR online report: <http://dnr.wi.gov, keyword "rare animal field report form">.

Management Guidelines

The following guidelines typically describe actions that will help maintain or enhance habitat for the species. These actions are not mandatory unless required by a permit, authorization or approval.

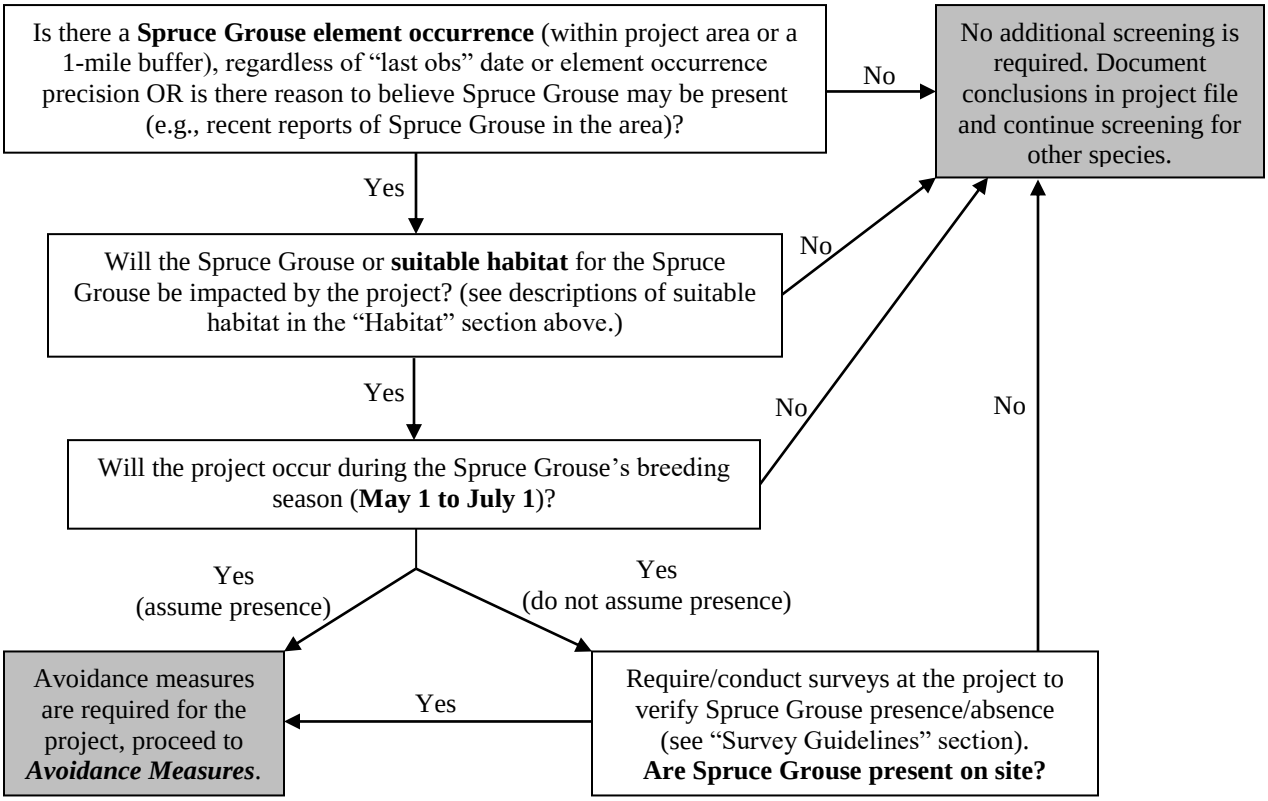
Spruce Grouse conservation in Wisconsin requires conservation of large areas of black spruce-tamarack forest with adjacent upland conifer types of upland spruce, jack pine, or red pine. Focus conservation efforts in the appropriate ecological landscapes, including north central forest and northern highland, and to a lesser extent, northeast sands and northwest sands (WDNR 2005). Within these landscapes, key conservation sites include Chequamegon-Nicolet National Forest, Brule River State Forest, Northern Highland State Forest (Worland et al. 2009), and Vilas County Forest. Because Spruce Grouse are highly vulnerable to projected climate changes (see "Climate Change Impacts" section), it is necessary to maintain and expand the representation of suitable habitat within these areas. Suitable habitat has the following components: 1) mosaic of upland and lowland coniferous forests, especially black spruce-tamarack adjacent to upland spruce, and/or jack or red pine, 2) dense ericaceous shrub layer, and 3) branches and/or shrubs in the 2-8m (6.5-26 ft) vertical stratum. The U.S. Forest Service has developed a set of climate change-adaptation tools and approaches for northern Wisconsin that includes an extended illustration of Spruce Grouse-oriented adaptation at sites across 1.5 million acres of the Chequamegon-Nicolet National Forest (Swanston et al. 2012). This detailed illustration provides adaptation approaches that are useful in helping make grouse populations and their habitat resistance to climate-change impacts.

Appropriate management decisions will depend on landscape context and site-specific characteristics. Landscapes that provide the highest reproductive potential for Spruce Grouse contain a mosaic of upland and lowland coniferous forest stands of different age classes and high levels of forest connectivity (Whitcomb et al. 1996, Harrison 2001). Landscapes dominated by deciduous forest and/or mixed deciduous-coniferous forest have a low potential for Spruce Grouse conservation (Worland et al. 2009). Within coniferous forests managed for Spruce Grouse, choose management techniques that will limit hardwood regeneration to <10% and retain connectivity of conifer patches. Avoid harvest activities in conifer swamps and adjacent conifer uplands from March through July. Retain forest stands that are >100 ha (250 acres) and of the appropriate tree composition for Spruce Grouse, i.e., white spruce, black spruce, tamarack, and jack pine. Increase forest connectivity within fragmented coniferous forests by establishing corridors >80m (260 ft) wide between existing forest stands or leave uncut coniferous forest strips >80 m wide between harvested forest stands (Potvin and Cortois 2006). Implement actions that enhance the ability of lowland conifer forest types to adapt to climate change. For example, managers should consider restoring water flow at control points to benefit lowland conifer hydrology, including road decommissioning, culvert replacement, and installation of water control structures (Swanston et al. 2012).

Screening Procedures

The following procedures must be followed by DNR staff reviewing proposed projects for potential impacts to the species.

Follow the "Conducting Endangered Resources Reviews: A Step-by-Step Guide for Wisconsin DNR Staff" document (summarized below) to determine if Spruce Grouse will be impacted by a project (WDNR 2012):



Avoidance Measures

The following measures are specific actions required by DNR to avoid take (mortality) of state threatened or endangered species per Wisconsin's Endangered Species law (s. 29.604, Wis. Stats.). These guidelines are typically not mandatory for non-listed species (e.g., special concern species) unless required by a permit, authorization or approval.

According to Wisconsin's Endangered Species Law (s. 29.604, Wis. Stats.), it is illegal to take, transport, possess, process, or sell any wild animal on the Wisconsin Endangered and Threatened Species List (ch. NR 27, Wis. Admin. Code). Take of an animal is defined as shooting, shooting at, pursuing, hunting, catching or killing.

If *Screening Procedures* above indicate that avoidance measures are required for a project, follow the measures below. If you have not yet read through *Screening Procedures*, please review them first to determine if avoidance measures are necessary for the project.

1. The simplest and preferred method to avoid take of Spruce Grouse is to avoid directly impacting individuals, known Spruce Grouse locations, or areas of suitable habitat (described above in the "Habitat" section and in *Screening Procedures*).

2. If Spruce Grouse impacts cannot be avoided entirely, avoid impacts during the **breeding season (May 1 to July 1)**. Spruce Grouse are extremely rare in Wisconsin and sensitive to management impacts, so impacts even outside the breeding season must be carefully planned in consultation with a species expert (see *Contact Information*).

3. If Spruce Grouse impacts cannot be avoided, please contact the Natural Heritage Conservation Incidental Take Coordinator and the Wisconsin DNR Spruce Grouse species expert (see *Contact Information*) to discuss possible project-specific avoidance measures. If take cannot be avoided, an Incidental Take Permit or Authorization is necessary.

Additional Information

References

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Linked Websites:

- Cornell Lab of Ornithology All About the Birds: <http://www.allaboutbirds.org/guide/Spruce_Grouse/id>
- Spruce Grouse Continental Conservation Plan: < http://foolhen.org/>
- Natural Communities of Wisconsin: <http://dnr.wi.gov, key word "natural communities">
- Rare Animal Field Report Form: <http://dnr.wi.gov, key word "rare animal field report form">
- Wisconsin Bird Conservation Initiative All Bird Conservation Plan: <http://www.wisconsinbirds.org/plan/species/spgr.htm>
- Wisconsin Initiative on Climate Change Impacts: <http://www.wicci.wisc.edu/>
- Wisconsin Endangered and Threatened Species: <http://dnr.wi.gov, key word "endangered resources">
- Wisconsin Endangered and Threatened Species Permit: <http://dnr.wi.gov, key word "endangered species permit">
- Wisconsin Natural Heritage Inventory Working List Key: <http://dnr.wi.gov, key word "Natural Heritage Working List">
- Wisconsin Wildlife Action Plan: <http://dnr.wi.gov, key word "Wildlife Action Plan">

Funding

- Natural Resources Foundation of Wisconsin: <http://www.wisconservation.org/>
- USFWS State Wildlife Grants Program: <http://wsfrprograms.fws.gov/subpages/grantprograms/swg/swg.htm>
- Wisconsin Natural Heritage Conservation Fund
- Wisconsin DNR Division of Forestry

Contact Information (Wisconsin DNR Species Expert for Spruce Grouse)

- Refer to the Bird contact on the Rare Species and Natural Community Expert List

Contact Information (Federal Migratory Bird Treaty Permits or Questions)

- Larry Harrison, U.S. Fish and Wildlife Service, 5600 American Blvd. West, Suite 990, Bloomington, MN 55437-1458 (612-713-5489, Larry_Harrison@fws.gov)
  - See also <http://www.fws.gov/migratorybirds/mbpermits.html>

Endangered Resources Review Program Contacts

- General information (DNRERReview@wisconsin.gov)
- Rori Paloski, Incidental Take Coordinator, Wisconsin DNR, Bureau of Natural Heritage Conservation (608-264-6040, rori.paloski@wisconsin.gov)

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