DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R4–ES–2025–0210; FXES1111090FEDR–256–FF09E21000]

RIN 1018–BI23

Endangered and Threatened Wildlife and Plants; Threatened Species Status with Section 4(d) Rule for Southern Hognose Snake

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), propose to list the southern hognose snake (*Heterodon simus*), a small, fossorial snake species from the coastal plains and sandhills across the southeastern United States, as a threatened species under the Endangered Species Act of 1973, as amended (Act). This determination also serves as our 12-month finding on a petition to list the southern hognose snake. After a review of the best scientific and commercial data available, we find that listing the species is warranted. Accordingly, we propose to list the southern hognose snake as a threatened species with protective regulations under section 4(d) of the Act ("4(d) rule"). If we finalize this rule as proposed, it would add this species to the List of Endangered and Threatened Wildlife and extend the Act's protections to the species. We find that designating critical habitat for this species is prudent but not determinable at this time.

DATES: Comments must be received by [**INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***]. Comments submitted electronically using the Federal eRulemaking Portal (see **ADDRESSES**, below) must be received by 11:59 p.m. eastern time on the closing date. We must receive requests for a public hearing, in writing, at the address shown in **FOR FURTHER INFORMATION**

CONTACT by [**INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***].

ADDRESSES: *Comment submission:* You may submit comments by one of the following methods:

(1) *Electronically*: Go to the Federal eRulemaking Portal: https://www.regulations.gov. In the Search box, enter FWS–R4–ES–2025–0210, which is the docket number for this rulemaking. Then, click on the Search button. On the resulting page, in the panel on the left side of the screen, under the Document Type heading, check the Proposed Rule box to locate this document. You may submit a comment by clicking on "Comment."

(2) *By hard copy*: Submit by U.S. mail to: Public Comments Processing, Attn: FWS–R4–ES–2025–0210, U.S. Fish and Wildlife Service, MS: PRB/3W, 5275 Leesburg Pike, Falls Church, VA 22041–3803.

We request that you send comments only by the methods described above. We will post all comments on https://www.regulations.gov. This generally means that we will post any personal information you provide us (see **Information Requested**, below, for more information).

Availability of supporting materials: Supporting materials, such as the species status assessment report, are available at https://www.regulations.gov at Docket No. FWS–R4–ES–2025–0210 and at https://ecos.fws.gov/ecp/species/3248.

FOR FURTHER INFORMATION CONTACT: Christy Johnson-Hughes, Field Supervisor, U.S. Fish and Wildlife Service, South Carolina Ecological Services Field Office; 843–727–4707; christy_johnsonhughes@fws.gov. Individuals in the United States who are deaf, deafblind, hard of hearing, or have a speech disability may dial 711 (TTY, TDD, or TeleBraille) to access telecommunications relay services. Individuals outside the United States should use the relay services offered within their country to

make international calls to the point-of-contact in the United States. Please see Docket No. FWS–R4–ES–2025–0210 on https://www.regulations.gov for a document that summarizes this proposed rule.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish a rule. Under the Act, a species warrants listing if it meets the definition of an endangered species (in danger of extinction throughout all or a significant portion of its range) or a threatened species (likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range). If we determine that a species warrants listing, we must list the species promptly and designate the species' critical habitat to the maximum extent prudent and determinable. We have determined that the southern hognose snake meets the Act's definition of a threatened species; therefore, we are proposing to list it as such. Listing a species as an endangered or threatened species can be completed only by issuing a rule through the Administrative Procedure Act rulemaking process (5 U.S.C. 551 et seq.).

What this document does. We propose to list the southern hognose snake as a threatened species with protective regulations under section 4(d) of the Act.

The basis for our action. Under the Act, we may determine that a species is an endangered or threatened species because of any of five factors: (A) the present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence. We have determined that the southern hognose snake meets the Act's definition of a threatened species due to the following threats: under Factor A, habitat loss, conversion, and fragmentation (due to conversion for agriculture, silviculture, and development); and under Factor E, road

mortality, effects of small population size, invasive species, and effects of increased temperatures, decreased precipitation, increased severe weather such as drought, flooding, or storms, resulting in changes in wildfire frequency and intensity, decreased ability to conduct prescribed burns, and sea level rise.

Section 4(a)(3) of the Act requires that the Secretary of the Interior (Secretary), to the maximum extent prudent and determinable, concurrently with listing designate critical habitat for the species. Section 3(5)(A) of the Act defines critical habitat as (i) the specific areas within the geographical area occupied by the species, at the time it is listed, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protections; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination by the Secretary that such areas are essential for the conservation of the species. Section 4(b)(2) of the Act states that the Secretary must make the designation on the basis of the best scientific data available and after taking into consideration the economic impact, the impact on national security, and any other relevant impacts of specifying any particular area as critical habitat.

We have determined that critical habitat is not determinable at this time for the southern hognose snake. The Act allows the Service an additional year to publish a critical habitat designation that is not determinable at the time of listing (16 U.S.C. 1533(b)(6)(C)(ii)).

Information Requested

We intend that any final action resulting from this proposed rule will be based on the best scientific and commercial data available and be as accurate and as effective as possible. Therefore, we request comments or information from other governmental agencies, Native American Tribes, the scientific community, industry, or any other

interested parties concerning this proposed rule. We particularly seek comments concerning:

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

(a) Biological or ecological requirements of the species, including habitat requirements for feeding, breeding, and sheltering;

(b) Genetics and taxonomy;

(c) Historical and current range, including distribution patterns and the locations of any additional populations of this species;

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

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

(2) Threats and conservation actions affecting the species, including:

(a) Factors that may be affecting the continued existence of the species, which may include habitat modification or destruction, overutilization, disease, predation, the inadequacy of existing regulatory mechanisms, or other natural or manmade factors;

(b) Biological, commercial trade, or other relevant data concerning any threats (or lack thereof) to this species; and

(c) Existing regulations or conservation actions that may be addressing threats to this species.

(3) Additional information concerning the historical and current status of this species.

(4) Information to assist us with applying or issuing protective regulations under section 4(d) of the Act that may be necessary and advisable to provide for the conservation of the southern hognose snake. In particular, we seek information concerning:

(a) The extent to which we should include any of the Act's section 9 prohibitions in the 4(d) rule;

(b) Whether we should consider any additional or different exceptions from the prohibitions in the 4(d) rule;

(c) Impacts (conservation and economic) associated with implementing the 4(d) rule;

(d) How frequently and in what geographical areas are activities that we propose to regulate under the 4(d) rule (e.g., sale, "take") currently occurring;

(e) Whether there are other laws currently in place that regulate the activities or "take" prohibited in the proposed 4(d) rule;

(f) The pet market for the southern hognose snake, including how many U.S.-based businesses sell southern hognose snakes domestically as pets or export and what portion of revenues for these businesses come from the sale of southern hognose snakes;

(g) The number of individuals that keep the southern hognose snake as a pet, and in which regions or States;

(h) The entities likely to request section 10(a)(1)(A) permits for conducting activities that would involve "take" such as capture or handling of the southern hognose;

(i) Data available on the time and economic costs of obtaining section 10(a)(1)(A) permits for these activities;

(j) The entities likely to develop habitat conservation plans and request section 10(a)(1)(B) permits for conducting activities that would involve incidental "take" of the southern hognose;

(k) Data available on the time and economic costs of obtaining section 10(a)(1)(B) permits for these activities; and

(l) Any other entities not addressed in this proposed rule that may be affected by the 4(d) rule.

(5) Information to assist us with identifying critical habitat, including any information as to why we should or should not designate habitat as "critical habitat" under section 4 of the Act.

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

Please note that submissions merely stating support for, or opposition to, the action under consideration without providing supporting information, although noted, do not provide substantial information necessary to support a determination. Section 4(b)(1)(A) of the Act directs that determinations as to whether any species is an endangered or a threatened species must be made solely on the basis of the best scientific and commercial data available, and section 4(b)(2) of the Act directs that the Secretary shall designate critical habitat on the basis of the best scientific data available.

You may submit your comments and materials concerning this proposed rule by one of the methods listed in **ADDRESSES**. We request that you send comments only by the methods described in **ADDRESSES**.

If you submit information via https://www.regulations.gov, your entire submission—including any personal identifying information—will be posted on the website. If your submission is made via a hardcopy that includes personal identifying information, you may request at the top of your document that we withhold this information from public review. However, we cannot guarantee that we will be able to do so. We will post all hardcopy submissions on https://www.regulations.gov.

Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on https://www.regulations.gov.

Our final determination may differ from this proposal because we will consider all comments we receive during the comment period as well as any information that may become available after this proposal. Based on the new information we receive (and, if relevant, any comments on that new information), we may conclude that the species is endangered instead of threatened, or we may conclude that the species does not warrant listing as either an endangered species or a threatened species. In addition, we may change the parameters of the prohibitions or the exceptions to those prohibitions in the protective regulations issued under section 4(d) of the Act if we conclude it is appropriate in light of comments and new information received. For example, we may expand the prohibitions if we conclude that the protective regulation as a whole, including those additional prohibitions, are necessary and advisable to provide for the conservation of the species. Conversely, we may establish additional or different exceptions to the prohibitions in the final rule if we conclude that the activities would facilitate or are compatible with the conservation and recovery of the species. In our final rule, we will clearly explain our rationale and the basis for our final decision, including why we made changes, if any, that differ from this proposal.

Public Hearing

Section 4(b)(5) of the Act provides for a public hearing on this proposal, if requested. Requests must be received by the date specified in **DATES**. Such requests must be sent to the address shown in **FOR FURTHER INFORMATION CONTACT**. We will schedule a public hearing on this proposal, if requested, and announce the date, time, and place of the hearing, as well as how to obtain reasonable accommodations, in the *Federal Register* and local newspapers at least 15 days before the hearing. We may hold the public hearing in person or virtually via webinar. We will announce any public hearing on our website, in addition to the *Federal Register*. The use of virtual public hearings is consistent with our regulations at 50 CFR 424.16(c)(3).

Previous Federal Actions

We published a 12-month finding for the southern hognose snake on October 7, 2019, concluding that the species was not warranted for listing under the Endangered Species Act (84 FR 53336). On January 26, 2023, the Center for Biological Diversity filed a complaint alleging the 12-month finding violated the Endangered Species Act and Administrative Procedure Act (*Center for Biological Diversity* v. *Haaland, et. al., No. 1:23-cv-00221-RBW* (D.D.C.). We subsequently entered into a settlement agreement that required us to submit a new 12-month finding to the Office of the Federal Register as to whether the listing of the southern hognose snake as threatened or endangered is (a) not warranted; (b) warranted; or (c) warranted but precluded by other pending proposals, pursuant to the Act on or before August 27, 2025. The Service updated the species status assessment (SSA) report with new information and this report (Service 2024, entire) served as the scientific basis that informed this 12-month finding and proposed rule.

Peer Review

An SSA team prepared an updated SSA report for the southern hognose snake. The SSA team was composed of Service biologists, in consultation with other species experts. The SSA report represents a compilation of the best scientific and commercial data available concerning the status of the species, including the impacts of past, present, and future factors (both negative and beneficial) affecting the species.

In accordance with our joint policy on peer review published in the *Federal Register* on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review in listing and recovery actions under the Act (https://www.fws.gov/sites/default/files/documents/peer-review-policy-directors-memo-2016-08-22.pdf), we solicited independent scientific review of the information contained in the southern hognose snake SSA report. We sent the SSA report to three independent peer reviewers and received responses from two reviewers. Results of this

structured peer review process can be found at https://www.regulations.gov at Docket No. FWS–R4–ES–2025–0210. In preparing this proposed rule, we incorporated the results of these reviews, as appropriate, into the SSA report, which is the foundation for this proposed rule.

Summary of Peer Reviewer Comments

As discussed in **Peer Review** above, we received comments from two peer reviewers on the draft updated SSA report. We reviewed all comments we received from the peer reviewers for substantive issues and new information regarding the contents of the SSA report. The peer reviewers generally concurred with our methods and provided suggestions for clarifying the influences of threats, such as the red imported fire ants (*Solenopsis invicta*), and other editorial suggestions. Otherwise, no substantive changes to our analysis and conclusions within the SSA report were deemed necessary, and peer reviewer comments are addressed in version 2.1 of the SSA report (Service 2024, entire).

I. Proposed Listing Determination

Background

A thorough review of the taxonomy, life history, and ecology of the southern hognose snake is presented in the SSA report (version 2.1; Service 2024, entire).

The southern hognose snake is the smallest of hognose snake species and is endemic to the Coastal Plain ecoregion of the southeastern United States. States with known occurrence records include North Carolina, South Carolina, Georgia, Florida, Alabama, and Mississippi; however, historically, the species was distributed across much of the southeastern United States from the vicinities of Morehead City and Raleigh, North Carolina, south to Tampa, Florida; west to the Pearl River dividing Louisiana and Mississippi; and north to Calhoun County, Alabama (Meylan 1985, p. 375). For our assessment, occurrence records from 1880–2023 were used to define populations. We identified 233 populations across the historical range of the species, and through our

analysis, found that 87 are considered to be extant. We found 144 populations to be considered extirpated and identified 2 unknown populations through our assessment.

The southern hognose snake is associated with the longleaf pine savanna ecosystem. They occupy open-canopy, xeric, upland habitat with well-drained, sandy soils, characterized by pine-dominated or pine-oak woodland. The species favors savanna habitats with an open canopy and a grassy understory (Enge et al. 2016, p. 12), which were historically maintained through fire. The longleaf pine ecosystem is dependent on regular fire intervals and other disturbances to create and maintain open pine conditions that support the species' needs.

The southern hognose snake can be found in multiple physiographic regions across its range that include various habitat compositions. In North Carolina, they have been found in mixed oak-pine forests occurring on well-drained, sandy soils (Palmer and Braswell 1995 p. 176; Tuberville et al. 2000, p. 21). Typical habitat in North Carolina has been reported as longleaf pine-wiregrass (*Aristrida stricta*) and turkey oak (*Quercus laevis*) forests (Beane et al. 2014, p. 169). In Florida, sandhills with disturbed areas seem to be the core natural habitat and are frequently used, whereas, xeric hammock and scrub habitats are seldom used (Enge 1997, pp. 28–49; Enge et al. 2016, p. 12).

Southern hognose snakes typically range from 33 to 51 centimeters (cm) (13 to 20 inches (in)) and have short heads with a sharply upturned keeled snout. The head is dusky brown above the snout, with a dark transverse bar that often occurs on the snout in front of the eyes. The body scales are keeled and anal plate divided. We describe the southern hognose snake's three life stages to include: egg, hatchling/juvenile, and adult. Their prey consists of frogs and toads, small lizards, and in some cases invertebrates. Little is known about any specific habitat requirements that may be needed for nesting and hibernation. The southern hognose snake is strictly diurnal and highly fossorial, with observations of wild individuals made across all months.

Regulatory and Analytical Framework

Regulatory Framework

Section 4 of the Act (16 U.S.C. 1533) and the implementing regulations in title 50 of the Code of Federal Regulations set forth the procedures for determining whether a species is an endangered species or a threatened species, issuing protective regulations for threatened species, and designating critical habitat for endangered and threatened species.

The Act defines an "endangered species" as a species that is in danger of extinction throughout all or a significant portion of its range and a "threatened species" as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether any species is an endangered species or a threatened species because of any of the following factors:

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

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

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

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

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects.

We use the term "threat" to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term "threat" includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term "threat" may encompass—either together or separately—the source of the action or condition or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an "endangered species" or a "threatened species." In determining whether a species meets either definition, we must evaluate all identified threats by considering the species' expected response and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species, such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an "endangered species" or a "threatened species" only after conducting this cumulative analysis and describing the expected effect on the species.

The Act does not define the term "foreseeable future," which appears in the statutory definition of "threatened species." Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis which is further described in the 2009 Memorandum Opinion on the foreseeable future from the Department of the Interior, Office of the Solicitor (M–37021, January 16, 2009; "M-Opinion," available online at https://www.doi.gov/sites/doi.opengov.ibmcloud.com/files/uploads/M-37021.pdf). The foreseeable future extends as far into the future as the Service can make reasonably

reliable predictions about the threats to the species and the species' responses to those threats. We need not identify the foreseeable future in terms of a specific period of time. We will describe the foreseeable future on a case-by-case basis, using the best available data and taking into account considerations such as the species' life-history characteristics, threat projection timeframes, and environmental variability. In other words, the foreseeable future is the period of time over which we can make reasonably reliable predictions. "Reliable" does not mean "certain"; it means sufficient to provide a reasonable degree of confidence in the prediction, in light of the conservation purposes of the Act.

Analytical Framework

The SSA report documents the results of our comprehensive biological review of the best scientific and commercial data regarding the status of the species, including an assessment of the potential threats to the species. The SSA report does not represent our decision on whether the species should be proposed for listing as an endangered or threatened species under the Act. However, it does provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies.

To assess southern hognose snake viability, we used the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306–310). Briefly, resiliency is the ability of the species to withstand variable changes in environmental and demographic conditions (for example, wet or dry, warm or cold years); redundancy is the ability of the species to withstand catastrophic events (for example, droughts, large pollution events); and representation is the ability of the species to adapt to both near-term and long-term changes in its physical and biological environment (for example, climate conditions, pathogens). In general, species viability will increase with increases in resiliency, redundancy, and representation (Smith et al.

2018, p. 306). Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species' viability.

The SSA process can be categorized into three sequential stages. During the first stage, we evaluated the individual species' life-history needs. The next stage involved an assessment of the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. The final stage of the SSA involved making predictions about the species' future condition, including responses to positive and negative environmental and anthropogenic influences. Throughout all of these stages, we used the best available information to characterize viability as the ability of a species to sustain populations in the wild over time, which we then used to inform our regulatory decision.

The following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found at https://www.regulations.gov under Docket No. FWS–R4–ES–2025–0210 and at https://ecos.fws.gov/ecp/species/3248.

Summary of Biological Status and Threats

In this discussion, we review the biological condition of the species and its resources, and the threats that influence the species' current and future condition, in order to assess the species' overall viability and the risks to that viability.

Species Needs

We assessed the best available information to identify the physical and biological needs to support all life stages for the southern hognose snake. We identified the specific ecological needs for individuals to survive and reproduce, as well as support viable populations (see table 1, below). The species' needs are described in terms of the southern hognose snake's required conditions for feeding, breeding, sheltering, and movement/dispersal. We determined the main elements essential to the survival and

reproductive success of southern hognose snake individuals to be well-drained sandy soils, suitable vegetation structure and composition, presence of prey, and habitat connectivity (Service 2024, p. 14). These needs are described for individuals; however, the needs of individuals also result in needs for populations.

TABLE 1—THE ECOLOGICAL REQUISITES FOR SURVIVAL AND REPRODUCTIVE SUCCESS OF SOUTHERN HOGNOSE SNAKE INDIVIDUALS AND POPULATIONS.

Life stage	Survival and reproductive requisites	Resource function (BFSD)[1]	Description
Egg, juvenile, adult	Well-drained sandy soils	All	Supports burrowing and fossorial characteristics
Juvenile, adult	Vegetation structure and composition	All	Provides refuge from predation, creates needed microclimate conditions, supports prey species
Juvenile, adult	Adequate prey	F	Consists of mainly frogs and toads, with some lizards and invertebrates
Adult	Connectivity between suitable habitats	B, D	Supports genetic exchange

[1] The function of each resource or circumstance is indicated (Breeding – B; Feeding – F; Sheltering – S; Dispersal – D).

Feeding

The southern hognose snake has been reported to feed primarily on frogs and toads (anurans). The species also consumes small lizards and in some cases invertebrates (Ashton and Ashton 1981, p. 85; Beane et al. 1998, p. 45; Ernst and Ernst 2003, p. 153; Beane et al. 2011, p. 292, 2014, p. 171). Lizards and anurans may contribute equally to the southern hognose snake diet, or a possible diet shift with age or size may occur (Beane et al. 2014, p. 173). Lizards have only been found in the stomachs of smaller, juvenile individuals indicating lizards are a likely food source for the younger life stages (Beane et al. 2014, p. 173).

The specialized upturned snout of the southern hognose snake is used to dig out buried prey (Goin 1947, p. 275; Conant and Collins 1998, p. 328; Ernst and Ernst 2003, p. 153). It has been speculated that the southern hognose snake forages in the early morning, late evenings, or on cool days when some lizard prey, such as the six-lined

racerunner lizard (*Aspidoscelis sexlineatus*), emerge from its nocturnal burrows or is likely to be inactive (Beane et al. 2014, p. 173). The appropriate conditions for feeding are dependent on the presence of prey at the juvenile/adult life stages.

Breeding

The southern hognose snake is oviparous (egg-laying) and requires underground burrows for their nests. There is no information available regarding natural nests for the species; however, a similar species, the eastern hognose snake (*Heterodon platirhinos*) has been found to deposit eggs at 15 cm (5.9 in) below the surface in a gravel deposit, under a rock, and at depths of 10 to 15 cm (3.9 to 5.9 in) in sandy fields (Edgren 1955, pp. 105–108). The soils and substrate are important for providing the appropriate conditions for the species to create the nesting burrows using their shovel-like, upturned snout. The appropriate conditions for breeding are dependent on well-drained sandy soils, suitable vegetation structure and composition for individuals, and connectivity between suitable habitat for both individuals and populations (Service 2024, p 14).

Sheltering

The southern hognose snake is highly fossorial and remains underground much of its life. The species uses underground burrows for all life stages and for much of its life history needs. They excavate underground burrows vertically, through loose sandy soil using their upturned snout and will also utilize existing burrows of other species. During the non-breeding, colder temperature seasons, late fall to early spring, southern hognose snakes use underground burrows for their hibernacula. Southern hognose snakes were observed excavating and entering those hibernacula in North Carolina from late October to late November and emerging from late March to mid-April (Beane et al. 2007, p. 467). Individual snakes did not depend on stump holes or other existing subterranean chambers for hibernacula and did not display hibernaculum site fidelity, though the sample size was

small (n=4) (Beane et al. 2007, p. 467; Beane 2019, pers. comm.). The habitat conditions for the hibernacula are dependent on well-drained sandy soils.

The species is strictly diurnal with peak activity occurring in the late morning to early afternoon (Beane et al. 2014, p. 173) and will take cover for protection, resting, and thermoregulating in underground burrows while not above ground. The most rigorous report of the use of burrows by southern hognose snakes discussed finding animals at depths of 20 to 30 cm (7.9 to 11.8 in) of sand within open areas (Palmer and Braswell 1995, p. 178) and the burrows can be very obvious (Beane 2019, pers. comm.).

Southern hognose snakes have been reported to use existing southeastern pocket gopher (*Geomys pinetis*) mounds and gopher tortoise (*Gopherus polyphemus*) burrows (Stevenson et al. 2018, p. 547). It is suspected that they occasionally use the southeastern pocket gopher mounds for sub-surface thermoregulation, particularly on cool, sunny days and may be using the gopher tortoise burrows for both refugia and for foraging for anurans (Stevenson et al. 2018, p. 548). The appropriate conditions for sheltering are dependent on well-drained soils with suitable vegetation structure and composition (Service 2024, p. 14).

Movement/Dispersal

The southern hognose snake requires areas above ground that allow for movement and dispersal for hatchling/juvenile and adult life stages. Southern hognose snakes have relatively small home range sizes, between 8–30 hectares (19.7–74.1 acres) (Beane 2018, pers. comm.; Tuberville 2018, pers. comm.). One female southern hognose snake was reported to have moved 1.44 kilometer (0.9 mile) in one day (Beane 2018, pers. comm.). During the active seasons when the snakes emerge from their hibernacula and are moving above ground, they favor habitat where the canopy is open with a grassy understory (Enge et al. 2016, p. 12). The annual cycle of the southern hognose snake is characterized by seasonal peaks of activity (Tuberville et al. 2000, p. 21). Records for the species occur

across all months, but there are generally two peak periods of detection (when this species is above ground): breeding season (May–June) and hatchling season (October–November). The southern hognose snake is diurnal, with peak activity occurring in the late morning to early afternoon (Beane et al. 2014, p. 173).

Because southern hognose snakes are cryptic and difficult to detect, they are most often encountered along roads; therefore, the habitat descriptions associated with those road detections serve as a proxy to provide for a description of the habitat associated with the species' movement and dispersal. Habitat associations for a subset of southern hognose snakes were recorded between 1985–2012; of those records, 51 percent were found crossing roads between open longleaf pine-wiregrass-turkey oak forests; 12 percent were found crossing between longleaf pine-wiregrass-turkey oak forests and disturbed forests, old fields, or agricultural areas; and 37 percent were found crossing roads between various disturbed forests and ruderal habitats (old fields, agricultural plots, clear cuts, and rural yards), or between ruderal habitats (Beane et al. 2014, p. 173).

In Florida, southern hognose snakes have been found crossing roads near ruderal habitats, such as clearcuts, residential lawns, improved pastures, and old fields (Enge 1997, pp. 28–49; Enge and Wood 2003, p. 198; Enge et al. 2016, p. 12). In a study conducted from 1998–2001 in Hernando County, Florida, half of the southern hognose snakes observed crossing roads were found near longleaf pine-wiregrass-turkey oak forests and 48.7 percent of snakes were found near old fields, agricultural areas, or disturbed forest types (Enge and Wood 2003, p. 189, 2002, p. 371). Near Eglin Air Force Base along the Florida panhandle, road-killed hatchlings were observed adjacent to longleaf pine-turkey oak sandhill, invaded by off-site sand pine (Jensen 1996, p. 25; Tuberville et al. 2000, p. 21).

Southern hognose snakes are more commonly found in fire-maintained upland habitat than in agricultural areas, and when found in agricultural areas those areas are

typically adjacent to natural upland habitats. It is likely that natural upland habitats are optimal for individuals' survival and reproduction while agricultural and other low-impact areas of human use (e.g., pastures, pine plantations, rural and urban open areas) support survival and movement through these areas but may not support long-term viability of populations.

Not only do the individual snakes require sufficient area for their home ranges and movement that facilitates all life stages and their needs, but populations require connectivity between populations to retain genetic integrity and diversity within populations and to ensure long-term viability. Connectivity to allow for interbreeding amongst populations provides for the integrity of genetic diversity. Fragmentation and isolation of populations will eventually lead to increased inbreeding and increased homozygosity (pairing of two identical alleles of a particular gene) that contributes to the loss of alleles in the populations. Over time, as more and more genetic diversity continues to decline, alleles are lost, often leading to introduction of locked, deleterious traits.

Threats

Habitat Loss, Conversion, and Fragmentation

The longleaf pine ecosystem is a fire-dependent ecosystem that once dominated the Coastal Plain of the Atlantic and Gulf coast regions, from Virginia to Texas (Ware et al. 1993, p. 447). The longleaf pine uplands once covered an estimated 92 million acres (Frost 1993, p. 20). Original longleaf pine communities were old-growth, open-canopied, and contained a structure of two layers: canopy and diverse herbaceous groundcover. Frequently burned, the natural condition was a canopy cover that rarely exceeded 60 percent and permitted a grassy groundcover to flourish (Noss 2013, p. 9). By the 21st century, the longleaf pine community had declined to less than three million acres due to forest clearing and conversion for agriculture, silviculture, and development (Landers et al. 1995, p. 39; Jensen et al. 2008, p. 16). Much of today's forests is younger, denser

stands of slash pine (*Pinus elliottii*) or loblolly pine (*Pinus taeda*). There is also a substantial hardwood component and little or no herbaceous groundcover (Noel et al. 1998, pp. 534–535). Only about three percent of the remaining longleaf pine uplands remain in relatively natural condition due to the exclusion/suppression of naturally occurring wildfires (Frost 1993, p. 17; Simberloff 1993, p. 3). Absent or infrequent fire management, mechanical activities that disturb the soil, and habitat management that favors heavy shrub layers and closed canopy create conditions that are incompatible with the southern hognose snake's needs. For example, soil disturbance can cause direct mortality to southern hognose snakes due to their fossorial nature and may alter or damage the subterranean and the soil profile, rendering soils less suitable for snakes.

The longleaf pine ecosystem continues to be altered for agriculture, short-rotation pine plantations, residential, and commercial purposes. This habitat conversion has likely negatively impacted southern hognose snake populations (Enge et al. 2016, p. 21). Like other reptiles and amphibians associated with the longleaf pine ecosystem, the southern hognose snake has declined in parallel with the decline of the longleaf pine ecosystem (Beane et al. 2014, p. 168).

Human population growth in an area leads to increased commercial and residential development. Many "hotspots" of projected urban development are predicted to occur within or near known occurrence records for southern hognose snakes or suitable habitat. Urbanization results in the direct loss of habitat and increases fragmentation of habitat, as well as increases road mortality, human persecution, and domestic predators, such as cats (*Felis catus*) and dogs (*Canis lupus familiaris*).

Development increases the prevalence of roads and associated infrastructure, which increase the fragmentation of the habitat and additionally result in the potential for increased mortality from vehicular traffic. Habitat fragmentation is the breaking apart of contiguous habitat into multiple patches (Fahrig 2003, p. 509). Fragmentation can have a

variety of negative impacts on wildlife, including greater mortality rates associated with landscape modifications, more frequent encounters with humans, reduced resources in smaller patches, reduced reproduction, restricted gene flow, and increases in predation and competition (Wiens 1994, p. S97; Kjoss and Litvaitis 2001, p. 285). Reduction of larger habitat patches into smaller patches can lead to population declines due to limited resource availability and can also negatively affect day-to-day movement (Barbour and Litvaitis 1993, p. 326). Fragmentation may also negatively affect larger-scale movements such as dispersal and movement to nearby populations.

Species that require specialized habitats, such as the southern hognose snake, are thought to be vulnerable to habitat fragmentation (Wiens 1994, p. S101). While research is lacking to quantify the effects of fragmentation and urbanization on the southern hognose snake, continued fragmentation and urbanization is expected to drive habitat loss and degradation within the species' range.

Road Mortality

Roads create habitat fragmentation and pose a barrier to movement that can isolate populations and increase direct mortality for many snake species (Andrews and Gibbons 2005, p. 772). Snakes are more severely affected by road mortality than other animal groups because they are thought to use roads for thermoregulation and are relatively slow-moving (Rosen and Lowe 1994, p. 143). Some will remain immobile on roads in response to oncoming vehicles and are often intentionally hit by drivers (Bonnet et al. 1999, p. 40; Andrews and Gibbons 2005, p. 778). An increase in the number of mortalities from vehicles may result in reduced gene flow among populations, decreased potential for dispersal into fragmented habitats, and altered demographics in the form of lower survival and immigration rates, all of which can lead to declines or extirpation of southern hognose snake populations.

Roads that bisect high quality habitat have higher levels of mortality than those that bisect lower quality habitat (Shepard et al. 2008, p. 357). Snake populations could experience especially high levels of road mortality during periods where high traffic volumes and species' seasonal movements coincide (Ashley et al. 2007, p. 141). Snakes are more vulnerable to vehicle encounters when they travel outside of their normal home range, with the highest mortality occurring in adult males during the mating season, neonates or hatchlings immediately after birth or hatching, and adult females on egg laying migrations (Bonnet et al. 1999, p. 47).

Many records for southern hognose snake are from encounters on roads, which are documented as dead on road (DOR). In North Carolina, between 1985–2012, 764 southern hognose snakes were detected. Of those detections, 643 (84 percent) were observed DOR, 110 (14.4 percent) were observed alive on road (AOR), and 11 (1.4 percent) were encountered incidentally, not on a road (Beane et al. 2014, p. 170). The majority of those encountered were juveniles (Beane et al. 2014, pp. 170–171). Observations in Florida between 1998–2001 detected 39 southern hognose snakes, all of which were DOR, and 62 percent of those observations were juveniles (Enge and Wood 2002, p. 369; Enge and Wood 2003, p. 192). These studies indicate that southern hognose snakes are vulnerable to road mortality, particularly as juveniles.

Invasive Species

Negative impacts on wildlife associated with documented introductions of invasive species are increasing, but the long-term consequences of many introductions are still poorly known (Langkilde 2009, p. 208). The red imported fire ant (*Solenopsis invicta*), originating from South America, was first introduced as early as 1918 to the United States at the port of Mobile, Alabama and subsequently spread across the Southeast. (Wilson 1951, p. 68). Red imported fire ants can multiply rapidly, and infiltrate disturbed and early-successional habitats (Todd et al. 2008, p. 540). Reptiles are

particularly susceptible to red imported fire ants. Many species of reptiles are oviparous (egg-laying), and it has been shown that eggs and hatchlings can be depredated by red imported fire ants (Swartwout and Willson 2022, p. 139). Red imported fire ants are aggressive, and their stings can result in direct mortality, as well as reduced survival by preventing weight gain, altering behavior, changing foraging patterns, reductions in food availability, and altered habitat (Wilcox and Giuliano 2014, pp. 3–4).

The apparent declines and extirpations of the southern hognose snake are concurrent with the range expansion of red imported fire ants in the southeast United States. Portions of the snake's range within the coastal plains of Mississippi, Alabama, and the Florida panhandle were infested with red imported fire ants by 1958 and were the first to experience the full impact of red imported fire ant predation (Callcott and Collins 1996, p. 245; Mount 1981, p. 75). The last detections for southern hognose snakes were 1975 in Alabama and 1981 in Mississippi. There is some speculation that a time lag occurs between when an area becomes heavily infested with red imported fire ants and when the impacts become obvious (Mount 1981, p. 77). It should be noted that red imported fire ants have difficulty establishing colonies in excessively sandy soils; in such habitat, the impact would be less severe than in those capable of supporting dense populations of red imported fire ants (Mount 1981, p. 75). This may help explain why southern hognose snakes were extirpated from Mississippi and Alabama. The southern hognose snake has always been considered to be rare in these States. The soils are generally wetter west of the Mobile basin and are not as deep as the sandy soils in other portions of the range. Wetter soils are more readily colonized by red imported fire ants (LeBrun et al. 2012, p. 888). Thus, red imported fire ants were possibly one of the main factors leading to the southern hognose snake's extirpation from Mississippi and Alabama. This may also explain why southern hognose snakes continue to occupy areas that have deep sandy soils.

Not only are the eggs and hatchlings at risk of red imported fire ant attacks, juvenile and adult southern hognose snakes may be particularly susceptible to red imported fire ants because of its small size, slow speed, use of open areas and the fact that it is a burrowing species. This species also relies heavily on crypsis and will feign death as an antipredator defense by curling up on their backs to remain stationary while assessing the danger. This period of immobility does not work to fend off the attack, and provides time for red imported fire ants to overtake the snake with venomous stings (Beane et al. 2014, p. 174). It is possible that the slow, cryptic behavior of the southern hognose snake is maladaptive to the presence of red imported fire ants, creating an evolutionary trap that has contributed to its decline (Beane et al. 2014, p. 174).

Feral hogs (*Sus scrofa*) negatively affect almost all aspects of ecosystem structure and function where they are found (Jolley et al. 2010, p. 519). They are known to have significant impacts to native animal and plant communities through direct consumption and indirectly through rooting and soil disturbance (Barrios-Garcia and Ballari 2012, pp. 2284–2293). Reptiles and amphibians are particularly susceptible to impacts from feral hogs (Taylor and Hellgren 1997, p. 38; Jolley et al. 2010, p. 521). In addition to causing direct mortality to reptiles and amphibians, feral hogs also have indirect effects on populations through rooting and habitat alteration (Jolley et al. 2010, p. 520). Their rooting disturbs soil layers and natural decomposition cycles, which can lead to changes in nutrient cycling (Bratton 1975, pp. 1358–1359).

A study at Fort Benning, Georgia found that an entire population of feral hogs (i.e., estimated to be 3,196 individuals) could consume 3.16 million reptiles and amphibians per year (Jolley et al. 2010, p. 521). Feral hogs are known to consume the eastern spadefoot toad (*Scaphiopus holbrookii*), a critical prey base of the southern hognose snake (Jolley et al. 2010, p. 522). The eastern spadefoot toad remains underground for most of the year, but emerges on warm, rainy nights to breed during the

spring and summer months in the southeastern United States (Hansen 1958, p. 57). During these periods of breeding, eastern spadefoot toads are found at extremely high densities, and are a concentrated food source and focus for local populations of feral hogs (Jolley et al. 2010, p. 522). Since there is substantial overlap between feral hog occurrence and the range of the southern hognose snake, the level of amphibian prey consumed by feral hogs has the potential to locally impact the prey base of individual populations of the southern hognose snake. Additionally, for southern hognose snakes, feral hogs could also be a predator, particularly while foraging around wetland edges where snakes are searching for anuran prey (Enge et al. 2016, p. 22).

Cogongrass (*Imperata cylindrica*) was introduced into the United States as a forage crop and soil stabilizer in the early part of the 20th century. It is now considered one of the worst invasive weeds in the world (Holzmueller and Jose 2011, p. 436). Cogongrass is known to impact longleaf pine ecosystems in the southeast. It already occurs throughout much of the southern hognose snake's range and is predicted to continue to expand. Cogongrass can rapidly spread in disturbed areas and those undergoing habitat management and restoration. Unlike other undesirable species in xeric upland communities, cogongrass is well adapted to fire, and may rapidly spread following a disturbance in an ecosystem, such as a prescribed fire (Holzmueller and Jose 2011, pp. 436–437). Cogongrass displaces native grasses and forms thick dense stands that decrease native species biodiversity (Holzmueller and Jose 2011, p. 436).

When cogongrass invades an area, it can quickly result in habitat loss for many of the longleaf pine ecosystem associated species, such as gopher tortoises, which will not use invaded areas or consume cogongrass (Basiotis 2007, p. 21). Because it is fire adapted, cogongrass has additional impacts on the use of prescribed fire by altering fire regimes via increased fuel loads. This effect of cogongrass on fire behavior such that it increases the fire intensity and severity has the potential to directly increase southern

hognose snake mortality and the potential to indirectly impact southern hognose snakes through changes in habitat. Cogongrass invasion has reduced plant diversity and forage for keystone species and some ecosystem engineers (e.g., gopher tortoise), and facilitated other invasive plant species in areas where it has been left to spread (Basiotis 2007, p. 24; Lippincott 1997, pp. 48–65). While the effects of cogongrass on southern hognose snakes and habitat suitability have not been assessed, cogongrass is currently the most likely invasive plant that could negatively affect southern hognose snake habitat suitability and populations.

Effects of Climate Change

In the southeastern United States, climate change is expected to result in more frequent drought, more extreme heat (resulting in increases in air and water temperatures), increased heavy precipitation events (e.g., flooding), more intense storms (e.g., frequency of major hurricanes increases), and rising sea level and accompanying storm surge (Intergovernmental Panel Climate Change (IPCC) 2013, entire). Warming in the southeast is expected to be greatest in the summer, which is predicted to increase drought frequency, while annual mean precipitation is expected to increase slightly, leading to increased flooding events (Alder and Hostetler 2013, unpaginated; IPCC 2013, entire). Changes in climate may affect ecosystem processes and communities by altering the physical conditions experienced by organisms resulting in potential effects to the ecosystem and to individual species (DeWan et al. 2010, p. 7). These changes have the potential to impact southern hognose snakes, their prey, and habitat. There is uncertainty about how the ecosystems and species in this region will respond to the shifting climate, and effects on species of conservation concern may result from yet undetermined synergistic effects. Effects of climate change may act as a risk multiplier by increasing the risk and severity of more imminent threats such as urbanization or altered fire regimes.

Terrestrial ectotherms (animals that rely on external sources to regulate their body temperature), such as the southern hognose snake, may be at particularly high risk from climate change because they are less effective at buffering body temperature against ambient temperature. Southern hognose snakes rely on ambient thermal heterogeneity to regulate their temperature behaviorally. The ability to optimally regulate body temperatures by moving among diverse microhabitats affects their growth, locomotion, and reproduction (Aubret and Shine 2010, p. 246; Deutsch et al. 2008, p. 6668; Kearney et al. 2009, entire). Southern hognose snake reproduction is tied to seasons with suitable temperature and moisture regimes, and altered weather conditions during these seasons may result in frequently recurring bust years of reproductive failure, and ultimately population declines. In other reptiles, it has been shown that high temperatures that restrict foraging activity can lead to energy shortfalls, and ultimately reduced population growth (Gibbons et al. 2000, p. 660; Huey et al. 2010, p. 833; Sinervo et al. 2010, entire). Reptile species with specialized diets, such as the southern hognose snake, could be particularly vulnerable to changes in climate that affect their prey base, leading to potential population declines.

The most substantial impacts from climate change on the southern hognose snake are likely habitat based. Current and continued projected warming will increase the risk of wildfire, insect, wind, and disease damage to forests, and limit the number of suitable days to implement prescribed fire. The Southeast leads the nation in number of wildfires per year, and climate change will likely increase the frequency and intensity of wildfires (Blate 2009, p. 58; McNulty et al. 2013, p. 173). The projected temperature increase across the Southeast will likely contribute to increased fire frequency and intensity, total burned area, change in fuel conditions, and longer fire seasons (McNulty et al. 2013, p. 174). These changes in wildfire frequency and intensity have the potential to directly

harm individual snakes and could significantly impact individual southern hognose snake populations and their habitat.

Alternatively, constraints to managing southern hognose snake habitat with prescribed fire is likely the most substantial risk factor associated with climate change for the southern hognose. Predicted changes in temperature and precipitation due to climate change will limit the number of days with suitable conditions for controlled burns and will constrain the ability to manage habitat with prescribed burning. As the ability to implement prescribed fire becomes further constrained, the ability to reduce woody vegetation and maintain an open under- and mid-story from prescribed burning will be severely limited, and southern hognose snake habitat will likely degrade.

Additionally, sea level rise (SLR) poses additional risks to coastal populations of the southern hognose snake. Global mean sea level has risen about 16–21 cm (7–8 in) since 1900, with about half of that rise occurring since 1993 (Hayhoe et al. 2018, p. 85). In areas of the Southeast, tide gauge analysis reveals as much as 0.30 to 0.91 meters (1 to 3 feet) of local relative SLR in the past 100 years (Carter et al. 2018, p. 757). The future estimated amount that sea level will rise depends on the response of Earth's climate to warming, as well as on the future scenarios of human-caused emissions (Hayhoe et al. 2018, p. 85).

Coastal populations of southern hognose snakes are predicted to be directly impacted by inundation of upland habitat directly along the coast by SLR, resulting in loss of habitat. Although the amount of habitat predicted to be lost within a given population due to SLR varies considerably depending on the location of the population, coastal populations of southern hognose snake in the Atlantic Coastal Plain (North and South Carolina, Georgia and Florida), Florida peninsula, Florida ridge, and Alabama/Florida panhandle units are considered vulnerable to SLR, and loss of suitable

habitat within a population will result in a decreased probability that a given population will persist.

Persecution and Harassment

Humans have a long history of persecuting snakes. Whether a snake is venomous or not, they tend to be viewed as vile and loathsome creatures (Burghardt et al. 2009, p. 262). Fear of snakes, called ophidiophobia, has made snake conservation more difficult than other vertebrate groups (Burghardt et al. 2009, p. 262). The negative perception of snakes ranges from low interest, to harassment, to persecution resulting in deliberate killing. Many human-snake encounters result in the death of the snake (Whitaker and Shine 2000, p. 121). Due to the southern hognose snake's defensive behavior of flattening their head like a cobra, opening their mouth, and hissing loudly, they tend to be viewed as a threat to humans and thus when encountered in the wild they may be killed by people who do not know they are harmless (Kelley 2011, p. 19).

There has also been an increase in recreational herpetology by enthusiasts actively looking for the southern hognose snake because it is considered an uncommon species and they want to add this species to their life list. With the rise of social media there has been an increase of public knowledge of roads where it is easy to spot these animals. These hobbyists may not be collecting individuals, rather just photographing and releasing, but this increased harassment may cause individuals increased stress that could be detrimental to them. Additionally, the increase in traffic on the roads from hobbyists leads to increased road mortality for the species (Martin 2018, pers. comm.).

Hognose snakes have been in the North American pet trade dating back to the late 1980s and into the 1990s, but within the last several decades their numbers in the pet trade have expanded (Kelley 2011, p. 18). Many view hognose snakes as desirable pets due to their upturned snout and coloration making them aesthetically attractive, as well as their tendency to seldom bite, unless a hand or finger is mistaken for food (Kelley 2011,

p. 18). Endearing nicknames such as “hoggies” and the fact that they are rear fanged, carry mild venom, and will play dead, add to their mystique as pets (Kelley 2011, pp. 18–19). Western hognose snakes (*Heterodon nasicus*) comprise most of the pet trade, with eastern and southern hognose snakes having a smaller commercial role (Kelley 2011, p. 21). This may be because both the eastern and southern hognose snakes eat predominantly frogs and toads, and maintaining specimens in captivity can be more challenging (Kelley 2011, p. 19).

However, there is evidence that collection for the pet trade is a threat to this species. From 1990 to 1994, 135 wild-caught southern hognose snakes were reportedly sold in Florida, collected on primarily four areas of Florida roads where they were relatively abundant (Enge 2005, pp. 208–209). Although there is some potential that some of these snakes were misidentified and were actually eastern hognose snakes, this finding shows that there is a demand for the southern hognose snake in the pet trade (Enge et al. 2016, p. 22). Since the 1990s, the demand for this species continues and hatchlings often sell for more than $200 at reptile shows (Enge et al. 2016, p. 22; Kelley 2011, p. 19). In Florida, two areas of Madison and Suwannee counties are well known to snake hunters for sometimes producing red-colored individuals that are worth up to $500 (Enge et al. 2016, p. 22). Though the population impact of collecting southern hognose snakes from roads is unknown, social media has allowed rapid dissemination of locations of prime or new collecting areas, and commercial or recreational snake hunters may come from hundreds of miles away to look for this species (Enge et al. 2016, pp. 22–23).

Conservation Efforts and Regulatory Mechanisms

Suitable habitat for southern hognose snakes can be found within National Wildlife Refuges, National Forests, State lands, and other conservation areas across the species’ range. In fact, there are more than 45 Federal and State-owned properties within the range of the species that are managed for conservation (see table 3-1 in the SSA;

Service 2024, p. 31), not including private lands held in conservation easement. Most conservation lands owned by Federal and State agencies are expected to remain protected and managed for conservation purposes in the near future, which would eliminate the risk of direct loss of habitat to urbanization in these areas. Many of the conservation lands in which southern hognose snakes occur manage habitat for other longleaf-associated species, such as red-cockaded woodpeckers (*Leuconotopicus* (=*Dryobates*) (=*Picoides*) *borealis*) and gopher tortoises. This habitat management benefits the southern hognose snake when it results in an open canopy system with more diverse groundcover. Habitat improvements in these areas, including ecosystem restoration, enhancement, protection, prescribed burning, and mechanical upland habitat restoration conducted across the species' range have likely provided some benefits to the southern hognose snake.

Throughout the Southeast, 12 military installations have records of southern hognose snakes, and an additional 26 installations potentially have them (Petersen et al. 2017, pp. 3–20). Active prescribed burning programs are implemented on most military installations to manage for longleaf pine ecosystems, which also benefits conservation of the southern hognose snake. As part of implementation of the Sikes Improvement Act (16 U.S.C. 670a–670o), the Secretaries of the military departments are required to prepare and implement integrated natural resource management plans (INRMPs) for each military installation in the United States. No installations specifically include southern hognose snake habitat and population management prescriptions and goals within their INRMPs; however, most of the INRMPs do include specific management for other longleaf pine ecosystem species, such as the red-cockaded woodpecker and gopher tortoise, which would provide some benefit to southern hognose snakes. The Department of Defense's Readiness and Environmental Protection Integration (DoD REPI) Program also offers opportunities to expand land conservation beyond installation boundaries to prevent encroachment and maintain military training flexibility, which also benefits the southern

hognose snake through habitat conservation. Working through landscape partnerships, the DoD REPI Program has helped protect, restore, and maintain longleaf pine habitat across the Southeast.

There are several initiatives and programs in the Southeast whose objectives include the establishment, restoration, and management of the native upland longleaf pine ecosystem. These include the Working Lands for Wildlife programs of the Natural Resources Conservation Service, the Service Partners for Fish and Wildlife programs, and America's Longleaf Restoration Initiative. Public land partners, including Federal and State agencies, private landowners, and non-governmental organizations are all active partners in America's Longleaf Restoration Initiative. This is a collaborative effort of multiple public and private sector partners that actively supports range-wide efforts to restore and conserve longleaf pine ecosystems with a 15-year goal to increase longleaf pine coverage from 3.4 to 8 million ac. These efforts are focused on 16 significant landscapes, which are areas with large existing longleaf pine blocks, often anchored by public lands. Within these significant landscapes, local implementation teams (LITs) are leading conservation efforts by coordinating partners, developing priorities, and fundraising to implement on-the-ground conservation. The majority of LITs are working within the range of the southern hognose snake, and each of these teams support restoration of longleaf habitat and serve an important role in southern hognose snake habitat restoration and management. Over the past decade, more than 1.3 million ac of longleaf pine has been planted and now 4.7 million ac of longleaf forests occur across the historical range (America's Longleaf Restoration Initiative 2019, p. 2).

Conservation benefit agreements (CBA), previously candidate conservation agreements with assurances (CCAA) and safe harbor agreements, are voluntary commitments made by non-Federal partners to undertake actions that will remove or reduce threats to the agreement's covered species. The goal of any CBA is to provide a

net conservation benefit to the covered species that contributes to the recovery or conservation of the species included in the agreement. As an incentive to the non-Federal property owner who engages in voluntary conservation actions for a particular species or group of species, landowners are given regulatory assurances if the species is listed under the Act. In September 2023, the Service, Florida Fish and Wildlife Conservation Commission, and Georgia Department of Natural Resources, in cooperation with Tall Timbers Research Station, finalized the Quail County Programmatic CCAA for North Florida and Southwest Georgia. This programmatic CCAA aims to enroll landowners to manage lands to the benefit of the covered species, including the southern hognose snake (Service et al. 2023, entire) and to date, one landowner has enrolled, totaling 100 acres.

North Carolina, South Carolina, and Georgia consider the southern hognose snake as threatened and protected by State statutes. In these States it is generally illegal to take, possess, transport, or sell southern hognose snakes (North Carolina General Statutes, Chapter 113 Article 25; South Carolina Code of State Regulations, Chapter 123; Rule and Regulations of the State of Georgia, Chapter 391-4-10). These States do issue permits for scientific research. Alabama and Mississippi list the southern hognose snake as endangered; however, it is presumed extirpated based on our analysis. In Florida, the southern hognose snake is ranked as a species of greatest conservation need (Florida Fish and Wildlife Conservation Commission 2019, p. 156); however, this status does not afford the species additional protections.

Cumulative Effects

We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have analyzed the cumulative effects of identified threats and conservation actions on the species. To assess the current and future condition of the species, we evaluate the effects of all the relevant factors that may be influencing the species, including threats and conservation efforts. Because the SSA

framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire species, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative-effects analysis.

Current Condition

To describe the southern hognose snake's current condition, we assessed the species' population resiliency and the overall redundancy and representation across its current range considering the threats and conservation actions acting on the species.

Resiliency describes the ability of a population to withstand stochastic disturbance. Stochastic events are those arising from random factors such as weather, flooding, or fire. Resiliency is positively related to demographic and habitat variables that may be influenced by connectivity among populations. Generally speaking, populations need enough individuals within habitat patches of adequate area and quality to maintain survival and reproduction in spite of disturbance. Each population's persistence (i.e., probability that a site is currently occupied by a southern hognose snake) was estimated using a modified version of a population persistence model that was developed in the species' previous SSA report, version 1.0, and subsequently published in peer-reviewed literature (Service 2019, appendix B; Crawford et al. 2020, entire).

Based on expert input, we developed and used the following categories to describe the values associated with each population's probability of persistence across the range: unlikely to persist (<50 percent), more likely than not to persist (≥50 percent), very likely to persist (≥80 percent), and extremely likely to persist (≥95 percent), see table 2, below (Service 2024, p. 46). Although a number of populations were determined likely to currently be extant at >50 percent probability, the habitat conditions and connectivity may be impaired, resulting in lower current resiliency than the category that corresponded to their current persistence probability. To evaluate current resiliency, we assessed metrics using each population's probability of persistence, habitat suitability,

and connectivity of populations across the species' range (Service 2024, p. 45–46). We described the resiliency of the 87 extant populations based on the probability of persistence along with habitat variables that include habitat suitability and connectivity using three categories: high, moderate, and low.

For the habitat suitability metrics, we examined an existing habitat suitability model (HSI) to evaluate whether conditions on the landscape are sufficient to support populations and their needs into the near future (Service 2024, 45–46). A HSI value of 0.4 is the threshold for locations where southern hognose snakes occur versus where they do not occur. This value is estimated by the best available data and the model is a formalization of the relationships between conditions that experts have determined are important for southern hognose snake population persistence.

We then examined connectivity in terms of the spatial distance (km and mi) between each population and its closest population. We considered that a population must have other extant populations within 10 km (6.21 mi) to provide demographic connectivity that contribute to genetic diversity within the species, whereas a population that is further away than 10 km (6.21 mi) from its closest population indicates an isolated population. The 10 km (6.21 mi) distance was determined based on expert opinion on how far an individual snake within a population could travel to another population. A population is considered to have some level of resiliency if it occurs on suitable habitat and has connectivity to another extant population. A population is considered to have low resiliency if it does not occur on suitable habitat (HSI <0.4) or there is no connectivity to populations within the 10 km (6.21 mi) threshold.

TABLE 2—RESILIENCY CATEGORIES OF EXTANT POPULATIONS THAT INCLUDE PROBABILITY OF PERSISTENCE (PERCENTAGES), HABITAT SUITABILITY (HABITAT SUITABILITY INDEX (HSI), AND CONNECTIVITY METRICS (DISTANCE FROM CLOSEST EXTANT POPULATION).

Resiliency	Probability of persistence	Habitat suitability	Connectivity km (mi)
High	>80%	Average HSI value >0.4	≥1 extant population

			within 10 km (6.21 mi)
Moderate	50–79.9%	Average HSI value >0.4	≥1 extant population within 10 km (6.21 mi)
Low	≥50%	Average HSI value >0.4	0 populations within 10 km (6.21 mi)
Low	≥50%	Average HSI <0.4	≥1 extant population within 10 km (6.21 mi)
Low	≥50%	Average HSI <0.4	0 populations within 10 km (6.21 mi)

We considered a population to be highly resilient if it had a relatively high current persistence probability, had suitable habitat available, and had other extant populations within 10 km. Moderate resilient populations had a probability of persistence of 50 to 79.9 percent, had suitable habitat available, and had other extant populations within 10 km (6.21 mi).Low resiliency populations indicate a combination of low population persistence, and either or both, lack of suitable habitat or no connectivity, indicating that the needs of those southern hognose snake populations are not being fully met. Extirpated populations were those that had ≤50 percent probability of persistence. Of the 87 extant populations, 17 populations (19.5 percent) have high resiliency, 9 populations (10.3 percent) have moderate resiliency, and 61 (70.1 percent) have low resiliency. 144 (61.8 percent) populations are considered extirpated (see table 3, below).

TABLE 3—NUMBER OF SOUTHERN HOGNOSE SNAKE POPULATIONS (N=233) AND NUMBER OF EXTANT POPULATIONS WITH THEIR CURRENT RESILIENCIES.

Population resiliency categories	**Number of populations in each category**	**Percentage of extant populations**
High	17	19.5%
Moderate	9	10.3%
Low	61	70.1%
Extirpated	144	0.0%
Unknown	2	0.0%

Representation reflects the ability of a species to adapt to changing environmental conditions and can be measured by the breadth of genetic and/or environmental diversity within and among populations. For the southern hognose snake, we do not have

information related to genetic diversity. In the absence of species-specific genetic information, representation can be assessed based on a species' ecological diversity information such as the extent and variability of habitat characteristics across the species' geographical range (Wolf et al. 2015, p. 204).

Ecoregions are a system of classification based on physiography, where areas with similar characteristics of land formation, dominant soil and vegetation types, climate, air and sea currents, and distribution of flora and fauna are grouped into a single ecoregion (Bailey 1983, entire; Bailey et al. 1994, entire). Ecoregions have been used to reflect broad areas within which local adaptations and genetic coadaptation have likely occurred. Therefore, we used ecoregions to act as an appropriate proxy for factors likely to influence the adaptive capacity (i.e., genetic diversity and ecological diversity) of southern hognose snakes across the landscape. After further analysis, we delineated the southern hognose snake range into representative units based on grouping Environmental Protection Agency Level IV Ecoregions by similar ecological characteristics (e.g., soil, geology) and dividing the ecoregions where barriers limited contiguous habitat and movement due to large rivers, such as the Savannah, Chattahoochee-Apalachicola, and Mobile-Tombigbee Rivers where appropriate (Service 2024, pp. 46–47). The nine representative units include Upper Coastal Plain (Carolinas), Upper Coastal Plain (Georgia/Florida), Atlantic Coastal Plain (Carolinas), Atlantic Coastal Plain (Georgia/Florida), Florida Peninsula, Florida Ridge, Alabama/Florida Panhandle, West (Alabama/Mississippi), and Alabama Central. We considered how the distributional and habitat variation between the representative units is indicative of the species' ability to adapt to changing environmental condition (adaptive capacity). We also considered the species' behavior to understand its' ability to adapt in a changing environment.

Redundancy describes the ability of a species to withstand catastrophic events. A catastrophic event is defined here as a rare, destructive event or episode that may have

impacts on a population or multiple populations, such as unpredictable, destructive forces that may affect the species acutely in time. Redundancy is about spreading risk among populations, and thus, is assessed by characterizing the number and distribution of populations relative to the scale of anticipated species-relevant catastrophic events across a species' range. The greater the number of populations the species has distributed over a larger area, the better the chances that the species can withstand catastrophic events. For the southern hognose snake, we used the number and distribution of moderate to high resiliency populations within the representative units and across the range of the species to measure redundancy. To have high redundancy, the species needs to have multiple moderate to high resiliency populations within representative units and throughout its range.

Current representation for the southern hognose snake is reduced from historical levels due to range contraction and loss of populations, see table 4. The species is currently represented in seven representative units that have at least one population with moderate to high resiliency, and the southern hognose snake is distributed across multiple representative units across most of the historical range. Two representative units (Alabama Central and West (Alabama/Mississippi)) have no extant populations currently, and one representative unit (Atlantic Coastal Plain (Georgia/Florida)) is at risk of becoming extirpated with the loss of 12 of 14 populations. Therefore, there has been a loss of latitudinal and longitudinal variability within the species' range. The southern hognose snake occurs in longleaf pine savanna ecosystems with well-drained sandy soils, and the well-drained, sandy soils are needed to meet important life history characteristics for this species. Given this, as well as the species' fossorial nature, we expect the species may be limited in its capacity to shift in space in a changing environment. Coupled with the range contraction and loss of populations, the species has lost some adaptive capacity compared to historical conditions.

TABLE 4—SOUTHERN HOGNOSE SNAKE REPRESENTATIVE UNITS WITH THE NUMBER OF POPULATIONS AND THE CURRENT RESILIENCY CATEGORIES FOR EXTANT (N=87) POPULATIONS WITHIN EACH UNIT.*

Representative units	Extirpated	Extant	Low resiliency	Moderate resiliency	High resiliency
Upper Coastal Plain (Carolinas)	23	9	8	0	1
Upper Coastal Plain (Georgia/Florida)	23	37	28	2	7
Atlantic Coastal Plain (Carolinas)	30	9	8	1	0
Atlantic Coastal Plain (Georgia/Florida)	12	2	1	1	0
Florida Peninsula	20	13	7	2	4
Florida Ridge	7	9	7	0	2
Alabama/Florida Panhandle	18	8	2	3	3
West (Alabama/ Mississippi)	7	0	0	0	0
Alabama Central	4	0	0	0	0
Range-wide	144	87	61	9	17

* The first column also indicates those populations that are considered extirpated as of 2023 (n=144) within each unit in order to account for the current resiliency of all populations within the nine representative units (n=233) and range-wide.

With the loss of latitudinal and longitudinal variability , the current redundancy of the southern hognose snake has been reduced from historical conditions. As discussed above, nine representative units were delineated, and we determined that each representative unit has likely lost between 37.7 percent to 100 percent of its populations. Range-wide, the number of populations has decreased by 61.8 percent, relative to the historical number of populations as determined from records since 1880. Although the southern hognose snake has experienced a decline in the number of populations across its range, the species is currently represented in seven representative units that have at least one population with moderate to high resiliency and four representative units that have

more than two populations with high resiliency. In term of distribution, the southern hognose snake is distributed across multiple representative units across most of the historical range. However, the distributions of populations within each representative unit are clustered, leaving areas of each representative unit with a reduced distribution of populations and a loss of connectivity. Therefore, the species currently has a lower redundancy than historical conditions, and the species may be more vulnerable to the effects of catastrophic events, such as drought, wildfire, disease outbreak. For additional details on the individual patterns of the representative units to determine redundancy, please refer to the SSA report, version 2.1 (Service 2024, pp. 48–49, and 57–58).

Future Condition

In evaluating future conditions for the southern hognose snake, we considered the threats as described above and how they may influence future viability of the species. The threats we analyzed for the future conditions include habitat loss, conversion, and fragmentation, specifically, urbanization, percentage of compatible land cover, compatible land cover (square kilometers (km^2)), fire frequency (percentage of years burned), burn window days per year, total burns (2023–2080), and habitat suitability index, and climate change. We developed six plausible scenarios projecting the future at three time steps out to years 2040, 2060, and 2080.

Projections of habitat loss due to urban development and climate change were carried forward in our assessment of southern hognose snake populations and the overall viability of the species. We were not able to model impacts from invasive species, such as red imported fire ants and feral hogs, human persecution and increased harassment, over-collection for the pet trade, and disease, because datasets and other information sources do not exist that capture the extent and degree of impact of these stressors to southern hognose snake populations across the species' range. However, these factors may also influence the species' viability in the future.

Using our six plausible scenarios, we performed spatial analyses to predict changes in land cover and fire frequency under various levels of urbanization (low, medium, high), as well as for SLR, and climate change induced changes to the burn windows that dictate opportunities for prescribed fire (RCP 4.5 and RCP 8.5) into the future. Then, using the model framework developed for the current condition analysis, we created a stochastic simulation model that allowed us to project population persistence into the future as influenced by changes in habitat suitability, and summarized predicted patterns of population persistence to the years 2040, 2060, and 2080. Importantly, a feature of this model is that it does not incorporate colonization or recolonization (i.e., immigration or emigration), because that information is not well studied and is unavailable. Therefore, the model will predict population decline over time as the model is not accounting for new individuals joining the populations. To address this inherent feature of the model, we ran the model forward to 2040, 2060, and 2080 assuming no changes in urbanization or climate and SLR. This created a null expectation for model projected population losses against which we could compare the model with projected changes in urbanization, climate, and SLR and we referred to this as the null model. Based on the limitations of the model, confidence in the output is diminished beyond 2080 and we are unable to draw reliable predictions about the species' response to these threats/stressors. For additional information on the model methods and variables, refer to the SSA report, version 2.1 (Service 2024, pp. 72–77).

Using the simulation model, we predicted the future persistence probability for the extant populations in the species' range through the year 2080. All six scenarios yielded nearly identical predictions of the number and percentage of persistent populations. These patterns were seen across all future projections and across three time horizons (2040, 2060, and 2080). We followed similar steps as in the current condition analysis to summarize population resiliency by reporting the number of populations at

each persistence category, under these two future scenarios in years 2040, 2060, and 2080.

For all scenarios by 2080, future population persistence decreased from current conditions, and most populations that fell within the extremely likely on landscape (extant) (≥95 percent) threshold under current conditions were predicted to have lower persistence probabilities in the future and, thus, dropped to lower categories. The number and percentage of populations likely to be extirpated (<50 percent persistence probability) increased for all scenarios and future time horizons, relative to current conditions. Under the low urbanization/RCP 4.5 scenario by 2040, 19 populations were predicted to be extirpated. Between 2040 and 2060, an additional 25 populations were predicted to be extirpated, and between 2060 and 2080, an additional 12 populations were predicted to be extirpated. Thus, a total of 56 of the 87 extant populations were predicted to become extirpated by 2080, see table 5, below. The results were predicted to be very similar for the high urbanization/RCP 8.5 scenario; therefore, below, we only discuss the numbers for the low urbanization/RCP 4.5 scenario.

In terms of resiliency of extant populations, by 2040, 13 populations were predicted to have high resiliency, 12 populations to have moderate resiliency, and 43 populations to have low resiliency. By 2080, 2 populations were predicted to have high resiliency, 14 to have moderate resiliency, and 15 to have low resiliency (Service 2024, p. 83).

TABLE 5—CURRENT AND FUTURE CONDITION SUMMARY OF THE NUMBER OF HIGH, MODERATE, LOW, AND EXTIRPATED POPULATIONS, AND THEIR PERCENTAGE OF THE TOTAL EXTANT POPULATIONS AT 2040, 2060, AND 2080.*

Population resiliency	Current condition		2040		2060		2080	
	No. of pops	% of extant total	No. of pops	% of extant total	No. of pops	% of extant total	No. of pops	% of extant total

High	17	19.54	13	14.94	7	8.05%	2	2.30
Moderate	9	10.34	12	13.79	10	11.49%	14	16.09
Low	61	70.11	43	49.43	26	29.89%	15	17.24
Extirpated	-	-	19	21.84	44	50.57%	56	64.37

* Numbers are reported as the number of populations that are predicted to change in each of the resiliency categories over time and are from the best-case scenario (RCP 4.5).

The similarity in results among each of the stressor scenarios suggest that future population declines predicted to occur are primarily a consequence of annual population persistence probabilities being less than one for each population and our model not including processes for colonization or recolonization, rather than a consequence of the threats we modelled (decreased habitat suitability due to climate change and urbanization). This indicates that the changes captured by the future scenarios are not large enough to substantially affect future population persistence at the time scales considered (even though urbanization and climate change may affect persistence over longer time periods). Additionally, it indicates that a number of populations estimated to be persisting in 2023 are existing under conditions that do not support long-term persistence. In other words, it suggests an extinction debt, where there is a lag between conditions causing extinction and the actual extinction events. Limited differences between the null model and future scenarios may also reflect a lack of available spatial data for other threats, which may cause larger declines if their effects were able to be included within the future scenarios (e.g., invasive species, disease, increases in soil temperature).

Future representation is projected to decline from current conditions in the future, due to fragmentation of suitable habitat and decreased connectivity within and among representative units, see table 6, below. As mentioned under Current Condition, given the species' fossorial nature and habitat needs, the species may be limited in its capacity to shift in space in a changing environment. With the predicted declines in the future, the species is projected to have reduced adaptive capacity, and therefore, representation is low.

Similarly, we project declines in redundancy within representative units and throughout the species range, due to predicted population losses and resiliency decreases in the future, see table 6. Under the low urbanization/RCP 4.5 scenario by 2040, six of seven representative units were predicted to be occupied by at least one population with moderate to high resiliency. By 2080, five of seven representative units were predicted to be occupied by at least one population with moderate to high resiliency. This was a decline from seven representative units currently having at least one population in moderate to high resiliency. By 2080, only one representative unit (Upper Coastal Plain (Georgia/Florida) was predicted to have more than two populations in moderate to high resiliency by 2080; the remaining four representative units have only one or two moderate to high resiliency populations by 2080. Two representative units were predicted to have no extant populations by 2080. These predicted losses in populations, resiliency, and range will cause the species to be vulnerable to the effects of single catastrophic events, such as large-scale drought, wildfires, hurricanes, and disease outbreaks. In term of distribution, the southern hognose snake was projected to have reduced distribution within and across multiple representative units, given the predicted extirpations and low resiliency populations. In addition, the distributions of remaining moderate to high resiliency populations within each representative unit are clustered, resulting in reduced connectivity. Given this, the species is projected to have low redundancy.

TABLE 6—CURRENT AND FUTURE HIGH, MODERATE, AND LOW RESILIENCY POPULATIONS AND THEIR REPRESENTATIVE UNIT.

Representative unit	Scenario							
	Current conditions				Low urbanization/RCP 4.5*			
	Extant	Low	Moderate	High	Extirpated	Low	Moderate	High
Year 2040								
Upper Coastal Plain (Carolinas)	9	8	0	1	5	3	0	1
Upper Coastal Plain (Georgia/Florida)	37	28	2	7	8	20	3	6
Atlantic Coastal Plain (Carolinas)	9	8	1	0	2	6	1	0
Atlantic Coastal Plain (Georgia/Florida)	2	1	1	0	2	0	0	0
Florida Peninsula	13	7	2	4	0	7	4	2
Florida Ridge	9	7	0	2	0	7	0	2
Atlantic/Florida Panhandle	8	2	3	3	2	0	4	2
Range-wide	**87**	**61**	**9**	**17**	**19**	**43**	**12**	**13**
Year 2060								
Upper Coastal Plain (Carolinas)	9	8	0	1	6	2	1	0
Upper Coastal Plain (Georgia/Florida)	37	28	2	7	15	13	5	4
Atlantic Coastal Plain (Carolinas)	9	8	1	0	7	2	0	0
Atlantic Coastal Plain (Georgia/Florida)	2	1	1	0	2	0	0	0
Florida Peninsula	13	7	2	4	8	2	2	1
Florida Ridge	9	7	0	2	0	7	0	2
Atlantic/Florida Panhandle	8	2	3	3	6	0	2	0
Range-wide	**87**	**61**	**9**	**17**	**44**	**26**	**10**	**7**
Year 2080								
Upper Coastal Plain (Carolinas)	9	8	0	1	7	1	1	0
Upper Coastal Plain (Georgia/Florida)	37	28	2	7	18	10	8	1
Atlantic Coastal Plain (Carolinas)	9	8	1	0	9	0	0	0
Atlantic Coastal Plain (Georgia/Florida)	2	1	1	0	2	0	0	0
Florida Peninsula	13	7	2	4	11	0	2	0
Florida Ridge	9	7	0	2	3	4	1	1
Atlantic/Florida Panhandle	8	2	3	3	6	0	2	0
Range-wide	**87**	**61**	**9**	**17**	**56**	**15**	**14**	**2**

* We only report the low urbanization/RCP 4.5 scenario for this table because the number of populations for the high urbanization/RCP 8.5 are the same.

Determination of Southern Hognose Snake Status

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of an endangered species or a threatened species. The Act defines an "endangered species" as a species in danger of extinction throughout all or a significant portion of its range and a "threatened species" as a species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether a species meets the definition of endangered species or threatened species because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence.

Status Throughout All of Its Range

After evaluating threats to the species and assessing the cumulative effect of the threats under the Act's section 4(a)(1) factors, we find that the overall viability of the southern hognose snake has declined and will continue to decline over time due to ongoing and future threats of habitat loss, conversion, and fragmentation (Factor A), loss of connectivity between populations (Factor A), road mortality (Factor E), invasive species (Factor E), and impacts from climate change (Factor E).

Our analysis to determine the species' status was based on the species' current and future conditions as described in the SSA report, version 2.1 (Service 2024, entire). We first considered the viability to determine if the species is in danger of extinction throughout all of its range. We determined that the species' current viability is sufficient to support populations across its range such that it is not in danger of extinction throughout its range. We recognize the species has fewer resilient populations, lower

redundancy, and lower representation across its range from its historical condition to current; however, the overall current viability is supporting the species across most of the representative units (Upper Coastal Plains (Carolinas), Upper Coastal Plain (Georgia/Florida), Atlantic Coastal Plain (Carolinas), Atlantic Coastal Plain (Georgia, Florida), Florida Peninsula, Florida Ridge, and Alabama/Florida Panhandle). There are currently 87 extant populations occurring across these seven representative units. When considering the 87 currently extant populations, we can reasonably say that 17 populations (approximately 20 percent) are at the highest level of resiliency because they have adequate suitable habitat and connectivity and have a high probability of persistence (≥80 percent), and 9 populations (approximately 10 percent) have moderate resiliency. Sixty-one populations (approximately 70 percent) are considered to have low resiliency.

The species' current representation and redundancy is reduced from historical condition. Given the habitat needs and the species' fossorial nature, the species may be limited in its capacity to shift in space in a changing environment, and coupled with the range contraction and loss of populations, the species has lost some adaptive capacity (representation) and may be more vulnerable to catastrophic events (such as drought, wildfire, etc.) compared to historical conditions. While there has been a decline in the number of current populations and range contraction for the southern hognose snake, the species is still relatively widespread in terms of geographic extent. It continues to maintain a level of representation in 7 of 9 analysis units with 26 current populations having moderate to high resiliency across all these representative units. In addition, there is at least one high or moderate resiliency population in each of the seven extant representative units. Thus, after assessing the best scientific and commercial data available, the current condition of the southern hognose snake still provides sufficient resiliency, redundancy, and representation that it is not in danger of extinction throughout all of its range.

When considering the future condition of the southern hognose snake, we found that the species' future viability is projected to decline as population resiliencies and the species' redundancy and representation decline due to ongoing and projected future threats acting on the species and its habitat. In the future, land-use change and other anthropogenic activities are projected to impact southern hognose snake habitat through loss of habitat and fragmentation. Our analysis of low urbanization/RCP 4.5 and high urbanization/RCP 8.5 future scenarios until 2080 encompasses the best available information for the realm of possible future projections of levels of urbanization, and it uses two different representative concentration pathways (RCPs) for climate change to look at the effects of prescribed burn windows. Beyond 2080, model confidence is diminished, and we are unable to draw reliable predictions about the species' response to these threats/stressors.

Loss of habitat and fragmentation associated with urbanization and climate change were projected to occur throughout the species' range. Under the low urbanization/RCP 4.5 scenario at 2080, 56 of the current 87 populations (approximately 64 percent) were predicted to be extirpated (less than 50 percent persistence probability), 2 populations were predicted to have high resiliency, 14 populations were predicted to have moderate resiliency, and 15 populations are predicted to have low resiliency. These numbers are identical for the high urbanization/RCP 8.5 scenario at 2080. Thus, for southern hognose snake, 16 moderate to high resiliency populations are predicted to remain on the landscape by 2080.

The species' future representation and redundancy was projected to be reduced from current condition. With the predicted declines in the future, the species is projected to have reduced adaptive capacity, and therefore, representation is low. Our analysis shows that future redundancy, across representative units and throughout the species' range, will also be low. By 2080, only two representative units are predicted to be

occupied by a single population with high resiliency and five representative units are predicted to be occupied at least one population with moderate resiliency. Additionally, by 2080, only one representative unit is predicted to have more than two populations with moderate resiliency. The Upper Coastal Plain (Georgia/Florida) representative unit is predicted to have the most extant populations with moderate to high resiliency (nine populations) in the future. However, this unit is also predicted to have reduced redundancy given the predicted extirpation of 18 populations and low resiliency of 10 populations by 2080. Thus, although this unit has the most extant populations in the future, the remaining populations in this unit are isolated. In addition, the projected declines result in reduced distribution for the species, with remaining populations clustered resulting in a loss of connectivity. Therefore, the species is vulnerable to the effects of catastrophic events. Given this, the species is projected to have low redundancy.

Additionally, while we were not able to model impacts from invasive species, human persecution and increased harassment, over-collection for the pet trade, and disease because datasets and other information sources do not exist that capture the extent and degree of impact of these stressors to southern hognose snake populations, these factors may also influence the species' viability in the future conditions and were considered in making this determination. Overall, the scope and magnitude of future threats are predicted to reduce the resiliency, representation, and redundancy of the southern hognose snake such it is at risk of extinction in the future. Thus, after assessing the best scientific and commercial data available, we conclude that southern hognose snake is not currently in danger of extinction but is likely to become so within the foreseeable future throughout all of its range.

Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so within the foreseeable future throughout all or a significant portion of its range. The court in *Center for Biological Diversity* v. *Everson*, 435 F. Supp. 3d 69 (D.D.C. 2020) (*Everson*) vacated the provision of the Service's Final Policy on Interpretation of the Phrase "Significant Portion of Its Range" in the Endangered Species Act's Definitions of "Endangered Species" and "Threatened Species" (Final Policy; 79 FR 37578; July 1, 2014) that provided if the Service determine that a species is threatened throughout all of its range, the Service will not analyze whether the species is endangered in a significant portion of its range.

Therefore, we proceed to evaluating whether the species is endangered throughout a significant portion of its range—that is, whether there is any portion of the species' range for which both (1) the portion is significant; and (2) the species is in danger of extinction in that portion. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species' range.

Following the court's holding in *Everson*, we now consider whether the species is in danger of extinction throughout a significant portion of its range. In undertaking this analysis for the southern hognose snake, we choose to address the status question first.

We evaluated the range of the southern hognose snake to determine if the species is in danger of extinction throughout any portion of its range. The range of a species can theoretically be divided in an infinite number of ways. We focused our analysis on portions of the species' range that may meet the Act's definition of an endangered species. For the southern hognose snake, we considered whether the threats or their effects on the species are greater in any biologically meaningful portion of the species'

range than in the rest of the range such that the species is in danger of extinction in that portion.

We examined all threats including habitat loss, conversion, and fragmentation, loss of connectivity between populations, road mortality, invasive species, and climate change, including cumulative effects as described in the *Threats* section above in determining portions to consider. By considering the seven representation units for the species, and the threats examined, we identified an area that includes the Atlantic Coastal Plain (Carolinas) and the Atlantic Coastal Plain (Georgia/Florida) as a portion to evaluate given the threats associated with SLR, coastal development, and increasing population isolation through habitat fragmentation. Both units within the portion were assessed to have no populations with high resiliency, only one population with moderate resiliency each, and the remaining populations with low resiliency. In addition, the Atlantic Coastal Plain (Georgia/Florida) population currently has only two extant populations, one assessed to be low and the other as moderate. Given only two populations in the Atlantic Coastal Plain (Carolinas) and the Atlantic Coastal Plain (Georgia/Florida) as a portion were assessed to have moderate resiliency, the current threats of coastal development and lack of connectivity due to habitat fragmentation appear to be having a greater impact to the populations in this portion. In addition, with only two populations remain with a moderate level of resiliency, there is limited capacity to withstand catastrophic events. Therefore, the status of this portion may be different than the remainder of the range.

We next addressed whether that portion is "significant." Two district courts vacated the definition of "significant" contained in the Final Policy (*Center for Biological Diversity* v. *Jewell*, 248 F. Supp. 3d 946, 959 (D. Ariz. 2017), hereafter, *CBD* v. *Jewell*, and *Desert Survivors* v. *U.S. Dep't of the Interior*, 321 F. Supp. 3d 1011, 1070-74 (N.D. Cal. 2018), hereafter, *Desert Survivors*). For the purposes of this analysis when considering whether a portion is "significant," we considered that portion of the range's

biological importance to the southern hognose snake. We evaluated the available information, including whether this portion occurs in unique habitat, contains high-quality or high value-habitat, or contains a large geographic portion of the suitable habitat, to assess its significance. The identified portion of the range that comprises Atlantic Coastal Plain (Georgia/Florida) and Atlantic Coastal Plain (Carolinas). This portion constitutes 14.9 percent of the species' current range. Therefore, this portion of the range does not constitute a sufficiently large proportion or geographic area of the current species' range. In addition, this portion does not contain habitat of high or unique value, such that it necessarily provides an important conservation value for the southern hognose snake. Accordingly, this portion is not a significant portion of the southern hognose snake's range and we find the species is not in danger of extinction in a significant portion of its range.

Therefore, we determine that the species is likely to become in danger of extinction within the foreseeable future throughout all of its range. This does not conflict with the courts' holdings in *Desert Survivors* and *CBD* v. *Jewell* because, in reaching this conclusion, we did not apply the aspects of the Final Policy, including the definition of "significant" that those court decisions held to be invalid.

Determination of Status

Based on the best scientific and commercial data available, we determine that the southern hognose snake meets the Act's definition of a threatened species. Therefore, we propose to list the southern hognose snake as a threatened species in accordance with sections 3(6) and 4(a)(1) of the Act.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened species under the Act include recognition as a listed species, planning and implementation of recovery actions, requirements for Federal protection, and prohibitions

against certain practices. Recognition through listing results in public awareness, and conservation by Federal, State, Tribal, and local agencies, foreign governments, private organizations, and individuals. The Act encourages cooperation with the States and other countries and calls for recovery actions to be carried out for listed species. The protection required by Federal agencies, including the Service, and the prohibitions against certain activities are discussed, in part, below.

The primary purpose of the Act is the conservation of endangered and threatened species and the ecosystems upon which they depend. The ultimate goal of such conservation efforts is the recovery of these listed species, so that they no longer need the protective measures of the Act. Section 4(f) of the Act calls for the Service to develop and implement recovery plans for the conservation of endangered and threatened species. The goal of this process is to restore listed species to a point where they are secure, self-sustaining, and functioning components of their ecosystems.

The recovery planning process begins with development of a recovery outline made available to the public soon after a final listing determination. The recovery outline guides the immediate implementation of urgent recovery actions while a recovery plan is being developed. Recovery teams (composed of species experts, Federal and State agencies, nongovernmental organizations, and stakeholders) may be established to develop and implement recovery plans. The recovery planning process involves the identification of actions that are necessary to halt and reverse the species' decline by addressing the threats to its survival and recovery. The recovery plan identifies recovery criteria for review of when a species may be ready for reclassification from endangered to threatened ("downlisting") or removal from protected status ("delisting"), and methods for monitoring recovery progress. Recovery plans also establish a framework for agencies to coordinate their recovery efforts and provide estimates of the cost of implementing recovery tasks. Revisions of the plan may be done to address continuing or new threats to

the species, as new substantive information becomes available. The recovery outline, draft recovery plan, final recovery plan, and any revisions will be available on our website as they are completed (https://www.fws.gov/program/endangered-species) or from our South Carolina Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Implementation of recovery actions generally requires the participation of a broad range of partners, including other Federal agencies, States, Tribes, nongovernmental organizations, businesses, and private landowners. Examples of recovery actions include habitat restoration (e.g., restoration of native vegetation), research, captive propagation and reintroduction, and outreach and education. The recovery of many listed species cannot be accomplished solely on Federal lands because their range may occur primarily or solely on non-Federal lands. To achieve recovery of these species requires cooperative conservation efforts on private, State, and Tribal lands.

If this species is listed, funding for recovery actions will be available from a variety of sources, including Federal budgets, State programs, and cost-share grants for non-Federal landowners, the academic community, and nongovernmental organizations. In addition, pursuant to section 6 of the Act, the States of Florida, Georgia, North Carolina, and South Carolina would be eligible for Federal funds to implement management actions that promote the protection or recovery of the southern hognose snake. Information on our grant programs that are available to aid species recovery can be found at: https://www.fws.gov/service/financial-assistance.

Although the southern hognose snake is only proposed for listing under the Act at this time, please let us know if you are interested in participating in recovery efforts for this species. Additionally, we invite you to submit any new information on this species whenever it becomes available and any information you may have for recovery planning purposes (see **FOR FURTHER INFORMATION CONTACT**).

Section 7 of the Act is titled, Interagency Cooperation, and it mandates all Federal action agencies to use their existing authorities to further the conservation purposes of the Act and to ensure that their actions are not likely to jeopardize the continued existence of listed species or adversely modify critical habitat. Regulations implementing section 7 are codified at 50 CFR part 402.

Section 7(a)(2) of the Act states that each Federal action agency shall, in consultation with the Secretary, ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. Each Federal agency shall review its action at the earliest possible time to determine whether it may affect listed species or critical habitat. If a determination is made that the action may affect listed species or critical habitat, formal consultation is required (50 CFR 402.14(a)), unless the Service concurs in writing that the action is not likely to adversely affect listed species or critical habitat. At the end of a formal consultation, the Service issues a biological opinion, containing its determination of whether the Federal action is likely to result in jeopardy or adverse modification.

In contrast, section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any action which is likely to jeopardize the continued existence of any species proposed to be listed under the Act or result in the destruction or adverse modification of critical habitat proposed to be designated for such species. Although the conference procedures are required only when an action is likely to result in jeopardy or adverse modification, action agencies may voluntarily confer with the Service on actions that may affect species proposed for listing or critical habitat proposed to be designated. In the event that the subject species is listed or the relevant critical habitat is designated, a conference opinion may be adopted as a biological opinion and serve as compliance with section 7(a)(2) of the Act.

Examples of discretionary actions for the southern hognose snake that may be subject to conference and consultation procedures under section 7 are management of Federal lands administered by the Department of Defense, U.S. Forest Service, and U.S. Fish and Wildlife Service, as well as actions that require a Federal permit (such as a permit from the U.S. Army Corps of Engineers under section 404 of the Clean Water Act (33 U.S.C. 1251 et seq.)) or actions funded by Federal agencies such as the Federal Highway Administration, Federal Aviation Administration, or the Federal Emergency Management Agency. Federal actions not affecting listed species or critical habitat—and actions on State, Tribal, local, or private lands that are not federally funded, authorized, or carried out by a Federal agency—do not require section 7 consultation. Federal agencies should coordinate with the South Carolina Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**) with any specific questions on section 7 consultation and conference requirements.

Section 9 of the Act provides a specific list of prohibitions for endangered species but does not provide these same prohibitions for threatened species. Instead, pursuant to section 4(d) of the Act, for any species listed as a threatened species, the Secretary must issue protective regulations that are "necessary and advisable to provide for the conservation of such species" (these are referred to as 4(d) rules). Additional measures for the southern hognose snake are described below (see **Protective Regulations Under Section 4(d) of the Act**, below).

Section 9(b)(1) provides an exemption from certain prohibited acts for qualifying pre-Act wildlife specimens. Specifically, Section 9(b)(1) states that the prohibitions of subsections (a)(1)(A) and (a)(1)(G) of section 9 shall not apply to any fish or wildlife which was held in captivity or in a controlled environment on (A) December 28, 1973, or (B) the date of the publication in the *Federal Register* of a final regulation adding such fish or wildlife to any list of species published pursuant to subsection (c) of section 4 of

this Act [as relevant to listed wildlife, the list of endangered and threatened wildlife (50 CFR 17.11) under the Act]: Provided, that such holding and any subsequent holding or use of the fish or wildlife was not in the course of a commercial activity.

For threatened species, prohibitions are promulgated by regulation under section 4(d), and a specimen may qualify for the exemption in 9(a)(1)(G) with regard to regulatory violations. For those specimens that continue to qualify under the "pre-Act" exemption, prohibitions under the 4(d) rule generally will not apply.

However, if a person engages in any commercial activity with an otherwise qualifying specimen—the wildlife would immediately cease to qualify as pre-Act wildlife and become subject to the relevant prohibition, because it has been held or used in the course of a commercial activity. Similarly, engaging in any activity prohibited by this 4(d) rule that also involves an actual or intended transfer of wildlife from one person to another person in the pursuit of gain or profit would involve holding or using the wildlife specimen in the course of a commercial activity. Therefore, if a person engages in such activity on or after the pre-Act date for a wildlife species with an otherwise qualifying specimen, it would be prohibited—the wildlife would immediately cease to qualify as pre-Act wildlife and become subject to the relevant prohibition, because it has been held or used in the course of a commercial activity.

We may issue permits to carry out otherwise prohibited activities involving threatened wildlife under certain circumstances. Regulations governing permits for threatened wildlife are codified at 50 CFR 17.32, and general Service permitting regulations are codified at 50 CFR part 13. With regard to threatened wildlife, a permit may be issued: for scientific purposes, for enhancing the propagation or survival of the species, or for take incidental to otherwise lawful activities. The statute also contains certain exemptions from the prohibitions, which are found in sections 9 and 10 of the Act.

II. Protective Regulations Under Section 4(d) of the Act

Background

As discussed above under **Available Conservation Measures**, section 9 of the Act provides a specific list of prohibitions for endangered species but does not provide these same prohibitions for threatened species. Instead, pursuant to section 4(d) of the Act, for any species listed as a threatened species, the Secretary must issue protective regulations that are "necessary and advisable to provide for the conservation of such species" (these are referred to as "4(d) rules"). Section 4(d) of the Act contains two sentences. The first sentence states that the Secretary shall issue such regulations as he [or she] deems necessary and advisable to provide for the conservation of species listed as threatened species. Conservation is defined in the Act to mean the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Additionally, the second sentence of section 4(d) of the Act states that the Secretary may by regulation prohibit with respect to any threatened species any act prohibited under section 9(a)(1), in the case of fish or wildlife, or section 9(a)(2), in the case of plants. With these two sentences in section 4(d), Congress delegated broad authority to the Secretary to determine what protections would be necessary and advisable to provide for the conservation of threatened species, and even broader authority to put in place any of the section 9 prohibitions, for a given species.

Courts have recognized the extent of the Secretary's discretion under section 4(d) to develop regulations that are appropriate for the conservation of threatened species. For example, courts have upheld, as a valid exercise of agency authority, rules developed under section 4(d) that included limited prohibitions against takings (see *Alsea Valley Alliance* v. *Lautenbacher*, 2007 WL 2344927 (D. Or. 2007); *Washington Environmental Council* v. *National Marine Fisheries Service*, 2002 WL 511479 (W.D. Wash. 2002)).

Courts have also upheld 4(d) rules that do not address all of the threats a species faces (see *State of Louisiana* v. *Verity*, 853 F.2d 322 (5th Cir. 1988)). As noted in the legislative history when the Act was initially enacted, "once an animal is on the threatened list, the Secretary has an almost infinite number of options available to him [or her] with regard to the permitted activities for those species. He [or she] may, for example, permit taking, but not importation of such species, or he [or she] may choose to forbid both taking and importation but allow the transportation of such species" (H.R. Rep. No. 412, 93rd Cong., 1st Sess. 1973).

Under our 4(d) authorities, we put in place protections intended to both prevent a threatened species from becoming an endangered species and to promote its recovery. The 4(d) rule explains what is prohibited for a threatened species, thus making the activity unlawful without a permit or authorization under the Act for the prohibited activity unless otherwise excepted in the 4(d) rule (species-specific 4(d) rules may also include affirmative requirements). Section 4(d) rules are therefore directly related to what actions may require permits in the future. As discussed in **Available Conservation Measures**, permits may be issued for purposes described in our threatened species permitting regulations at 50 CFR 17.32 and 17.72, including for recovery actions, conservation benefit agreements (previously referred to as candidate conservation agreements with assurances and safe harbor agreements), or habitat conservation plans. We may also except otherwise prohibited activities through a 4(d) rule itself, in which case threatened species permits would not be required for those activities. For example, there are two categories of exceptions that we frequently include in 4(d) rules, and these are for otherwise prohibited acts or forms or amounts of "take" that are: (1) unavoidable while conducting beneficial actions for the species, or (2) considered inconsequential (de minimis) to the conservation of the species. For otherwise prohibited take activities that require permits under section 10 of the Act, programmatic approaches—such as general

conservation plans and template habitat conservation plans—may be available as another way for project proponents to comply with take prohibitions or requirements applicable to one or more species while reducing the time that would otherwise be associated with developing individual permit applications. In addition, the Service and project proponents can reduce the need for such permits by developing standardized conservation measures that avoid the risk of "take."

The provisions of this species' proposed protective regulations under section 4(d) of the Act are one of many tools that we would use to promote the conservation of the southern hognose snake. The proposed protective regulations would apply only if and when we make final the listing of the southern hognose snake as a threatened species and finalize the 4(d) rule. Nothing in 4(d) rules changes in any way the recovery planning provisions of section 4(f) of the Act or the consultation requirements under section 7 of the Act. As mentioned previously in **Available Conservation Measures**, section 7(a)(2) of the Act requires Federal agencies, including the Service, to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of designated critical habitat of such species. In addition, even before the listing of any species or the designation of its critical habitat is finalized, section 7(a)(4) of the Act requires Federal agencies to confer with the Service on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed under the Act or result in the destruction or adverse modification of critical habitat proposed to be designated for such species. These requirements are the same for a threatened species regardless of what is included in its 4(d) rule.

A 4(d) rule does not alter section 7 obligations, including the criteria for informal or formal consultations or the analytical process used for biological opinions or concurrence letters. Section 7 consultation is required for Federal actions that "may

affect" a listed species regardless of whether take caused by the activity is prohibited or excepted by a 4(d) rule. For example, as with an endangered species, if a Federal agency determines that an action is "not likely to adversely affect" a threatened species, this will require the Service's written concurrence (50 CFR 402.13(c)). Similarly, if a Federal agency determines that an action is "likely to adversely affect" a threatened species, the action will require formal consultation with the Service and the formulation of a biological opinion (50 CFR 402.14(a)). Because consultation obligations and processes are unaffected by 4(d) rules, we may consider developing tools to streamline future intra-Service and interagency consultations for actions that result in forms of take that are not prohibited by the 4(d) rule (but that still require consultation). These tools may include consultation guidance, online consultation processes via the Service's digital project planning tool (Information for Planning and Consultation; https://ipac.ecosphere.fws.gov/), template language for biological opinions, or programmatic consultations.

Provisions of the Proposed 4(d) Rule

Exercising the Secretary's authority under section 4(d) of the Act, we have developed a proposed rule that is designed to address the southern hognose snake conservation needs. As discussed previously in **Summary of Biological Status and Threats**, we have concluded that the southern hognose snake is likely to become in danger of extinction within the foreseeable future primarily due to habitat loss and degradation as a result of land conversion and fragmentation causing loss of connectivity between populations, road mortality, invasive species, and climate change. Section 4(d) requires the Secretary to issue such regulations as they deem necessary and advisable to provide for the conservation of each threatened species and authorizes the Secretary to include among those protective regulations any of the prohibitions that section 9(a)(1) of the Act prescribes for endangered species (*In re: Polar Bear Endangered Species Act*

Listing and 4(d) Rule Litigation, 818 F. Supp. 2d 214, 228 (D.D.C. 2011) (citing *Sweet Home Chapter of Cmtys. for a Great Or.* v. *Babbitt*, 1 F.3d 1, 8 (D.C. Cir. 1993), *rev'd on other grounds*, 515 U.S. 687 (1995))). Our necessary and advisable determination for the southern hognose snake includes consideration of conservation and economic impacts (*Kansas Natural Resources Coalition, et al.* v. *USFWS, et al.* No. 23-CV-00159-DC-RCG (W.D. Tex. 2025)). We explain below why we find that, if finalized, the prohibitions and exceptions in this proposed rule as a whole satisfy the requirement in section 4(d) of the Act to issue regulations deemed necessary and advisable to provide for the conservation of the southern hognose snake.

The protective regulations we are proposing for southern hognose snake incorporate prohibitions from section 9(a)(1) to address the threats to the species. The prohibitions of section 9(a)(1) of the Act, and implementing regulations codified at 50 CFR 17.21, make it illegal for any person subject to the jurisdiction of the United States to commit, to attempt to commit, to solicit another to commit or to cause to be committed any of the following acts with regard to any endangered wildlife: (1) import into, or export from, the United States; (2) take (which includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct) within the United States, within the territorial sea of the United States, or on the high seas; (3) possess, sell, deliver, carry, transport, or ship, by any means whatsoever, any such wildlife that has been taken illegally; (4) deliver, receive, carry, transport, or ship in interstate or foreign commerce, by any means whatsoever and in the course of commercial activity; or (5) sell or offer for sale in interstate or foreign commerce. This proposed protective regulation includes all of these prohibitions for the southern hognose snake because the southern hognose snake is likely to become an endangered species within the foreseeable future and putting these prohibitions in place is intended to help to prevent further declines, maintain connectivity between populations, slow populations'

rate of decline, and decrease synergistic, negative effects from other ongoing or future threats.

As discussed above under **Summary of Biological Status and Threats**, habitat loss and degradation, road mortality, invasive species, and impacts from changes to climate are affecting the status of the species. In addition, there is evidence of demand for the southern hognose snake in the pet trade. Therefore, prohibiting take, and activities associated with import, export, trade, commerce, and sale is intended to help prevent further collections from the wild, that could result in population-level impacts to the species.

Under the Act, "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Some of these provisions have been further defined in regulations at 50 CFR 17.3. Take can result knowingly or otherwise, by direct and indirect impacts, intentionally or incidentally. Regulating take is intended to help preserve the species' remaining populations, retain connectivity, slow their rate of decline, and decrease cumulative effects from other ongoing or future threats. Therefore, we propose to prohibit take of the southern hognose snake, except for take resulting from those actions and activities specifically excepted by the 4(d) rule.

The proposed 4(d) rule would also provide for the conservation of the species by allowing exceptions that are intended to incentivize conservation actions or actions that are not expected to rise to the level that would have a negative impact (i.e., would have only de minimis impacts) on the species' conservation. Exceptions to the prohibitions would include the exceptions to the prohibition for endangered wildlife, as set forth in 50 CFR 17.21(c)(2)–(4), (d)(2) and 50 CFR 17.31(c). This includes allowing for any person to take southern hognose snake in defense of their own life or the lives of others and for law enforcement to possess and conduct other acts with illegally taken southern hognose

snake (50 CFR 17.21(c)(2)). In addition, to further the conservation of the species, any employee or agent of the Service, any other Federal land management agency, the National Marine Fisheries Service, a State conservation agency, or a federally recognized Tribe, who is designated by their agency or Tribe for such purposes, may, when acting in the course of their official duties, take threatened wildlife without a permit if such action is necessary to: (i) aid a sick, injured, or orphaned specimen; or (ii) dispose of a dead specimen; or (iii) salvage a dead specimen that may be useful for scientific study; or (iv) remove specimens that constitute a demonstrable but nonimmediate threat to human safety, provided that the taking is done in a humane manner (50 CFR 17.21(c)(3)). Such taking may involve killing or injuring only if it has not been reasonably possible to eliminate such threat by live capturing and releasing the specimen unharmed, in an appropriate area.

We recognize the special and unique relationship that we have with our State natural resource agency partners in contributing to conservation of listed species. State agencies often possess scientific data and valuable expertise on the status and distribution of endangered, threatened, and candidate species of wildlife and plants. State agencies, because of their authorities and their close working relationships with local governments and landowners, are in a unique position to assist us in implementing all aspects of the Act. In this regard, section 6 of the Act provides that we must cooperate to the maximum extent practicable with the States in carrying out programs authorized by the Act. Therefore, any qualified employee or agent of a State conservation agency that is a party to a cooperative agreement with us in accordance with section 6(c) of the Act, who is designated by their agency for such purposes, would be able to conduct activities designed to conserve southern hognose snake that may result in otherwise prohibited take without additional authorization.

We also propose exceptions to take prohibitions for incidental take resulting from habitat management activities that maintain or restore southern hognose snake habitat, including implementation of prescribed fire; actions to reduce the threat of invasive species; silviculture practices and forestry activities that follow State-recommended best management practices (BMPs), as well as operational and maintenance activities for electric infrastructure (described below) that are expected to have negligible impacts to the southern hognose snake and its habitat.

This proposed 4(d) rule applies exceptions from prohibitions for the southern hognose snake for incidental take resulting from activities that restore or maintain existing forest land use, and that when conducted in areas within the range of the southern hognose snake on suitable soils, result in the establishment and maintenance of open-canopy, pine-dominated forest stands across the landscape. As noted above, open-canopy, pine-dominated communities (including sandhill and scrub) support the southern hognose snake. However, incidental take resulting from activities that cause significant soil disturbance, including, but not limited to, mechanical site preparation practices (such as, wind-rowing, shearing that penetrates the soil surface, stumping, disking (except during fire break creation or maintenance), root-raking, and bedding) are not excepted under this proposed 4(d) rule. Significant soil-disturbing activities are not excepted because soil disturbance could have long-term impacts to southern hognose snake habitat and, as a cryptic fossorial species, southern hognose snake presence may not be readily detected before or during the activities, so incidental take may occur without the operator's knowledge. Incidental take resulting from the following specific activities is excepted in the 4(d) rule:

Prescribed burning—We are proposing an exception for take associated with prescribed burning, including all firebreak establishment and maintenance actions. Upland natural communities associated with southern hognose snakes are fire-maintained

communities. Implementing fire management creates and maintains the early successional, open-canopied conditions that benefit the southern hognose snake. Successional changes from fire exclusion or suppression in southern hognose snake habitat results in declines in habitat conditions.

Tree harvesting and planting—We are proposing an exception for take associated with tree thinning, tree harvest, planting pines (by hand or machine), and associated activities including skidding logs and the use of loading decks, which are necessary components of harvest operations. While information about the impacts of harvesting and planting is limited, we expect forest management regimes that create or maintain open-canopy, pine-dominated systems will enhance southern hognose snake habitat. Incidental take resulting from deforestation or conversion of forest to non-forest land use is not excepted under this proposed 4(d) rule, because deforestation and conversion of forest to non-forest land use would remove southern hognose snake habitat and have long term impacts on the species.

Maintenance of existing, unimproved forest roads and trails—We are proposing an exception for take associated with maintenance of roads and trails that provide access to habitat so that the habitat can be maintained and enhanced to benefit the southern hognose snake. However, the roads and trails must be unimproved, meaning those that are dirt, typically undisturbed soil, and unsurfaced. This exception includes only take associated with the maintenance of existing forest roads and trails, because creating new roads or trails would increase habitat fragmentation.

Forestry activities that implement State-recommended forestry BMPs—We are proposing an exception for take associated with forestry activities that implement State-recommended forestry BMPs, if those BMPs promote open-canopy forest conditions in upland habitats that improve habitat conditions and provide for the conservation of the southern hognose snake. To qualify for this exception, these activities must not result in

soil and subsurface disturbances that would disrupt the movement or safety of the southern hognose snake or damage its subsurface habitat.

Herbicide application—We are proposing an exception for take associated with herbicide application that targets control of woody or invasive vegetation and promotes the long-term restoration of native herbaceous vegetation. Such herbicide applications help create and maintain favorable habitat conditions for the southern hognose snake. These provisions include only herbicide applications conducted in a manner consistent with Federal and applicable State laws, including Environmental Protection Agency label restrictions and herbicide application guidelines as prescribed by manufacturers.

Electric infrastructure maintenance—We are proposing an exception for take associated with operational and maintenance activities, including tree removal and planting, tree trimming, debris management, and vegetation maintenance (e.g., mowing), associated with electric transmission and generation infrastructure and rights-of-way that minimize ground disturbance, so as not to disrupt the movement or safety of the southern hognose snake, or damage the southern hognose snake's subsurface habitat. We recognize certain mechanical management activities may be used for maintenance requirements to ensure safety and operation needs for electric infrastructure.

We find that the activities presented above, if taken by land managers in the range of the southern hognose snake, will generally result in maintaining or restoring habitat for the species and will further the goal of conserving the southern hognose snake. These activities will also continue to contribute to the southern hognose snake's conservation and long-term viability. Therefore, the prohibitions of this proposed 4(d) rule for the southern hognose snake would not apply to these activities.

We may under certain circumstances issue permits to carry out one or more otherwise prohibited activities, including those described above. The regulations that govern permits for threatened wildlife state that the Director of the Service may issue a

permit authorizing any activity otherwise prohibited with regard to threatened species. These include permits issued for the following purposes: for scientific purposes, to enhance propagation or survival, for economic hardship, for zoological exhibition, for educational purposes, for incidental taking, or for special purposes consistent with the purposes of the Act (50 CFR 17.32). The statute also contains certain exemptions from the prohibitions, which are found in sections 9 and 10 of the Act.

The 4(d) rule provides for the conservation of the southern hognose snake because it will regulate activities that pose a threat to the species. However, it also provides flexibilities in management and permitting requirements for several activities that are expected to have negligible impacts to the southern hognose snake and its habitat, as discussed above. Please see our "Consideration of Economic Costs for the Proposed 4(d) Rule for the Southern Hognose Snake" on https://www.regulations.gov for our consideration of economic impacts. We determined there would likely be limited change to the regulated community as a result of this rule. We do not envision many instances for the need for a permit for prohibited take under the 4(d) rule. Some number of individuals are anticipated to request permits for take associated with surveys or research activities. For incidental take, where there is no Federal nexus for section 7, depending on the situation, this will either be a new permit requirement, an alternative permit requirement, or an additional permit requirement, depending on what is already required by State law. Where there is a Federal nexus, the 4(d) rule does not change any obligations under section 7 of the ESA. Therefore, after considering the conservation needs of the species and the economic costs of the 4(d) rule, we have determined that the 4(d) rule is necessary and advisable to provide for the conservation of the species. We appreciate any public comment on the potential impacts (conservation and economic) of the proposed 4(d) rule.

As stated earlier, nothing in this proposed 4(d) rule will change in any way the recovery planning provisions of section 4(f) of the Act, the consultation requirements under section 7 of the Act, or the ability of the Service to enter into partnerships for the management and protection of the southern hognose snake. However, interagency cooperation may be further streamlined through planned programmatic consultations for the species between Federal agencies and the Service.

III. Critical Habitat

Background

Section 4(a)(3) of the Act requires that, to the maximum extent prudent and determinable, we designate a species' critical habitat concurrently with listing the species. Critical habitat is defined in section 3(5)(A) of the Act as:

(1) The specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (a) essential to the conservation of the species and (b) which may require special management considerations or protection; and

(2) Specific areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

Our regulations at 50 CFR 424.02 define the geographical area occupied by the species as an area that may generally be delineated around species' occurrences, as determined by the Secretary (i.e., range). Such areas may include those areas used throughout all or part of the species' life cycle, even if not used on a regular basis (e.g., migratory corridors, seasonal habitats, and habitats used periodically, but not solely by vagrant individuals).

Conservation, as defined under section 3(3) of the Act, means to use and the use of all methods and procedures that are necessary to bring an endangered or threatened

species to the point at which the measures provided pursuant to the Act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking.

Critical habitat receives protection under section 7 of the Act through the requirement that each Federal action agency ensure, in consultation with the Service, that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of designated critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve, or other conservation area. Such designation also does not allow the government or public to access private lands. Such designation does not require implementation of restoration, recovery, or enhancement measures by non-Federal landowners. Rather, designation requires that, where a landowner requests Federal agency funding or authorization for an action that may affect an area designated as critical habitat, the Federal agency consult with the Service under section 7(a)(2) of the Act. If the action may affect the listed species itself (such as for occupied critical habitat), the Federal agency would have already been required to consult with the Service even absent the critical habitat designation because of the requirement to ensure that the action is not likely to jeopardize the continued existence of the listed species. Even if the Service were to conclude after consultation that the proposed activity is likely to result in destruction or adverse modification of the critical habitat, the Federal action agency and the landowner are not required to abandon the proposed activity, or to restore or recover the species; instead, they must implement “reasonable and prudent alternatives” to avoid destruction or adverse modification of critical habitat.

Under the first prong of the Act's definition of critical habitat, areas within the geographical area occupied by the species at the time it was listed are included in a critical habitat designation if they contain physical or biological features (1) which are essential to the conservation of the species and (2) which may require special management considerations or protection. For these areas, critical habitat designations identify, to the extent known using the best scientific data available, those physical or biological features that are essential to the conservation of the species (such as space, food, cover, and protected habitat).

Under the second prong of the Act's definition of critical habitat, we can designate critical habitat in areas outside the geographical area occupied by the species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

Section 4(b)(2) of the Act requires that we designate critical habitat on the basis of the best scientific data available. Further, our Policy on Information Standards Under the Endangered Species Act (published in the *Federal Register* on July 1, 1994 (59 FR 34271)), the Information Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001 (Pub. L. 106–554; H.R. 5658)), and our associated Information Quality Guidelines provide criteria, establish procedures, and provide guidance to ensure that our decisions are based on the best scientific data available. They require our biologists, to the extent consistent with the Act and with the use of the best scientific data available, to use primary and original sources of information as the basis for recommendations to designate critical habitat.

When we are determining which areas should be designated as critical habitat, our primary source of information is generally the information compiled in the SSA report and information developed during the listing process for the species. Additional information sources may include any generalized conservation strategy, criteria, or

outline that may have been developed for the species; the recovery plan for the species; articles in peer-reviewed journals; conservation plans developed by States and counties; scientific status surveys and studies; biological assessments; other unpublished materials; or experts' opinions or personal knowledge.

Habitat is dynamic, and species may move from one area to another over time. We recognize that critical habitat designated at a particular point in time may not include all of the habitat areas that we may later determine are necessary for the recovery of the species. For these reasons, a critical habitat designation does not signal that habitat outside the designated area is unimportant or may not be needed for recovery of the species. Areas that are important to the conservation of the species, both inside and outside the critical habitat designation, will continue to be subject to: (1) conservation actions implemented under section 7(a)(1) of the Act; (2) regulatory protections afforded by the requirement in section 7(a)(2) of the Act for Federal agencies to ensure their actions are not likely to jeopardize the continued existence of any endangered or threatened species; and (3) the prohibitions found in the species-specific 4(d) rule. Federally funded or permitted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy findings in some cases. These protections and conservation tools will continue to contribute to recovery of the species. Similarly, critical habitat designations made on the basis of the best scientific data available at the time of designation will not control the direction and substance of future recovery plans, habitat conservation plans, or other species conservation planning efforts if new information available at the time of those planning efforts calls for a different outcome.

Critical Habitat Determinability

Our regulations at 50 CFR 424.12(a)(2) state that critical habitat is not determinable when one or both of the following situations exist:

(i) Data sufficient to perform required analyses are lacking, or

(ii) The biological needs of the species are not sufficiently well known to identify any area that meets the definition of "critical habitat."

We reviewed the available information pertaining to the biological needs of the southern hognose snake and habitat characteristics where this species is located, but sufficient data to perform the required consideration of economic impacts are lacking at this time. Therefore, we conclude that the designation of critical habitat for the southern hognose snake is not determinable at this time. The Act allows the Service an additional year to publish a critical habitat designation that is not determinable at the time of listing (16 U.S.C. 1533(b)(6)(C)(ii)).

Required Determinations

Clarity of the Proposed Rule

We are required by Executive Orders 12866 and 12988 and by the Presidential memorandum of June 1, 1998, to write all rules in plain language. This means that each rule we publish must:

(1) Be logically organized;

(2) Use the active voice to address readers directly;

(3) Use clear language rather than jargon;

(4) Be divided into short sections and sentences; and

(5) Use lists and tables wherever possible.

If you feel that we have not met these requirements, send us comments by one of the methods listed in **ADDRESSES**. To better help us revise the rule, your comments should be as specific as possible. For example, you should tell us the numbers of the sections or paragraphs that are unclearly written, which sections or sentences are too long, the sections where you feel lists or tables would be useful, etc.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (RFA; 5 U.S.C. 601 et seq.), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA; title II of Pub. L. 104–121, March 29, 1996), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of the agency certifies the rule will not have a significant economic impact on a substantial number of small entities. The SBREFA amended the RFA to require Federal agencies to provide a certification statement of the factual basis for certifying that the rule will not have a significant economic impact on a substantial number of small entities.

While we do not conduct RFA analyses on our classification determinations under the Act, in accordance with recent caselaw (*Kansas Natural Resources Coalition, et al.* v. *USFWS, et al.* No. 23-CV-00159-DC-RCG (W.D. Tex. 2025)) we comply with RFA through consideration of conservation and economic impacts when promulgating 4(d) rules. Please see our "Consideration of Economic Costs for the Proposed 4(d) Rule for the Southern Hognose Snake" on https://www.regulations.gov for our consideration of economic impacts. We have examined this proposed rule's potential effects on small entities as required by the RFA and based on our current information, we have determined that this action is unlikely to have a significant economic impact on a substantial number of small entities. We request information (see **Information Requested**) on the potential impacts of this proposed rule.

National Environmental Policy Act (42 U.S.C. 4321 et seq.)

Regulations adopted pursuant to section 4(a) of the Act are exempt from the National Environmental Policy Act (NEPA; 42 U.S.C. 4321 et seq.) and do not require an environmental analysis under NEPA. We published a notice outlining our reasons for this

determination in the *Federal Register* on October 25, 1983 (48 FR 49244). This exemption includes listing, delisting, and reclassification rules, as well as critical habitat designations and species-specific protective regulations promulgated concurrently with a decision to list or reclassify a species as threatened. The courts have upheld this position (e.g., *Douglas County* v. *Babbitt*, 48 F.3d 1495 (9th Cir. 1995) (critical habitat); *Center for Biological Diversity* v. *U.S. Fish and Wildlife Service*, 2005 WL 2000928 (N.D. Cal. Aug. 19, 2005) (concurrent 4(d) rule)).

Government-to-Government Relationship with Tribes

In accordance with the President's memorandum of (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951, May 4, 1994), E.O. 13175 ("Consultation and Coordination with Indian Tribal Governments"), the President's memorandum of November 30, 2022 (Uniform Standards for Tribal Consultation; 87 FR 74479, December 5, 2022), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with federally recognized Tribes and Alaska Native Corporations on a government-to-government basis. In accordance with Department of the Interior Secretary's Order 3206 ("American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act"), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. During our initiation of our status review and request for information on southern hognose snake, we contacted those federally recognized Tribes within the range of the species, including Tribes with Catawba Indian Nation, Poarch Band of Creek, and Seminole. We will continue to work with relevant Tribal entities during the development of the final determination for the southern hognose snake.

References Cited

A complete list of references cited in this rulemaking is available on the internet at https://www.regulations.gov at Docket No. FWS–R4–ES–2025–0210 and upon request from the South Carolina Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Field Office.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Plants, Reporting and recordkeeping requirements, Transportation, and Wildlife.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

1. The authority citation for part 17 continues to read as follows:

AUTHORITY: 16 U.S.C. 1361–1407; 1531–1544; and 4201–4245, unless otherwise noted.

2. In § 17.11, in paragraph (h), amend the List of Endangered and Threatened Wildlife by adding an entry for "Snake, southern hognose" in alphabetical order under REPTILES to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Common name	*Heterodon simus*	Where listed	Status	Listing citations and applicable rules
* * * * * * *				
REPTILES				
* * * * * * *				

Snake, southern hognose	*Heterodon simus*	Wherever found	T	[*Federal Register* citation when published as a final rule]; 50 CFR 17.42(v); [4d]
* * * * * * *				

3. As proposed to be amended at, 86 FR 62434 (November 9, 2021), 87 FR 58648 (September 27, 2022), 88 FR 68070 (October 3, 2023), 88 FR 68370 (October 3, 2023), and 89 FR 103938 (December 19, 2024), further amend § 17.42 by adding paragraph (v) to read as follows:

§ 17.42 Species-specific rules—reptiles.

* * * * *

(v) Snake, southern hognose (*Heterodon simus*).

(1) *Prohibitions.* The following prohibitions that apply to endangered wildlife also apply to the southern hognose snake. Except as provided under paragraph (v)(2) of this section and §§ 17.4 and 17.5, it is unlawful for any person subject to the jurisdiction of the United States to commit, to attempt to commit, to solicit another to commit, or cause to be committed, any of the following acts in regard to this species:

(i) Import or export, as set forth at § 17.21(b) for endangered wildlife.

(ii) Take, as set forth at § 17.21(c)(1) for endangered wildlife.

(iii) Possession and other acts with unlawfully taken specimens, as set forth at § 17.21(d)(1) for endangered wildlife.

(iv) Interstate or foreign commerce in the course of a commercial activity, as set forth at § 17.21(e) for endangered wildlife.

(v) Sale or offer for sale, as set forth at § 17.21(f) for endangered wildlife.

(2) *Exceptions from prohibitions.* In regard to this species, you may:

(i) Conduct activities as authorized by a permit under §17.32.

(ii) Take, as set forth at § 17.21(c)(2) through (c)(4) for endangered wildlife.

(iii) Take as set forth at § 17.31(b).

(iv) Possess and engage in other acts with unlawfully taken wildlife, as set forth at § 17.21(d)(2) for endangered wildlife.

(v) Take incidental to an otherwise lawful activity caused by:

(A) Prescribed burning, including all firebreak establishment and maintenance actions.

(B) Tree harvest , planting (by hand or machine), and associated activities including skidding logs and the use of loading decks.

(C) Maintenance of existing, unimproved forest roads and trails used for access for forest management.

(D) Forest management activities that:

(*1*) Implement State-recommended forestry best management practices;

(*2*) Promote open-canopy forest conditions in upland habitats;

(*3*) Do not result in soil and subsurface disturbances that would disrupt the movement or safety of the southern hognose snake; and

(*4*) Do not damage the southern hognose snake's subsurface habitat.

(E) Herbicide application that targets control of woody or invasive= vegetation and promotes the long-term restoration of native herbaceous vegetation. Such herbicide applications must be conducted in a manner consistent with Federal and applicable State laws, including Environmental Protection Agency label restrictions and herbicide application guidelines as prescribed by manufacturers.

(F) Operational and maintenance activities, including tree removal and planting, tree trimming, debris management, and vegetation maintenance (e.g., mowing), associated with electric transmission and generation infrastructure and rights-of-way, if such activities, minimize ground disturbance and do not disrupt the movement or safety of the southern hognose snake or damage the southern hognose snake's subsurface habitat.

Brian R. Nesvik,
Director,
U.S. Fish and Wildlife Service.

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