

ENVIRONMENTAL PROTECTION
ENDANGERED AND NONGAME SPECIES PROGRAM
Notice of Action on Petition for Rulemaking
Division of Fish and Wildlife Rules
N.J.A.C. 7:25-14.17; Northern Pine Snake classification
Petitioner: New Jersey Builders Association

Take notice that the Department of Environmental Protection (Department) has determined to deny a petition for rulemaking filed on July 22, 2009, by Elizabeth George-Cheniara, Esq., on behalf of the New Jersey Builders Association (petitioner). The petitioner requests that the Department amend its Fish and Wildlife Rules at N.J.A.C. 7:25-4.17. Particularly, the petitioner requests that the current rule, which classifies the Northern Pine Snake (*Pituophis melanoleucus*) as “threatened,” be amended to remove the “threatened” status of this species.

A notice of receipt of the petition was published in the New Jersey Register on September 8, 2009 at 41 N.J.R. 3320(a). Notice referring the petition for further deliberation not to exceed 90 days was published in the New Jersey Register on October 19, 2009 at 41 N.J.R. 3965(a).

The petitioner asserts that the current listing of the Northern Pine Snake as “State threatened” is unsupported by known scientific data and submits a report produced by its consultant in support of this assertion.

The petitioner asserts that, after initially listing the Northern Pine Snake as “threatened” in 1979 based upon a 1977 report, the Northern Pine Snake has been re-evaluated twice during the 1999 through 2001 timeframe utilizing the “Delphi Method,” which seeks to establish a consensus among experts for species listing and review. The petitioner asserts that the definition of “threatened” specified in the instructions for expert panels participating in reviewing status assessments for reptiles and amphibians under the Delphi Method is more expansive than the regulatory definition of a threatened species set forth in N.J.A.C. 7:25-4.1.

Petitioner asserts that the Delphi method was inappropriately applied because the Department did not utilize a principal investigator from outside the agency to ensure limited agency influence on participating panelists and many of the 18 panelists did not have experience with the Northern Pine Snake in New Jersey. The petitioner also asserts that the Delphi Method additionally requires participants to provide an explanation to support the basis of the decision-making process.

The petitioner indicates that various other methodologies are available to evaluate the population status of species that the Department could have used in addition to the Delphi Method to result in a more precise evaluation of the species' current status. The petitioner asserts that the information used by the Department related to known locations of Northern Pine Snakes does not include any quantitative estimates of the number of Northern Pine Snakes in New Jersey, nor is there any demonstration by the Department that the Northern Pine Snake population in the State has declined. In fact, petitioner asserts, the number of sightings may indicate that the species is not in jeopardy of becoming endangered, but has a robust population. Further, because the snakes' primary habitat is the preservation area of the Pinelands Area, which is protected from virtually any development and is subject to extensive public and non-profit conservation ownership, the Northern Pine Snake's habitat is unlikely to deteriorate as required by the definition of "threatened."

The Department has reached its determination to deny after thorough review and consideration of the petition and its attached report, an assessment of the status of the Northern Pine Snake (NJDFW, 2009; Status Assessment of the Northern Pine Snake (*Pituophis m. melanoleucus*) in New Jersey: An Evaluation of Trends and Threats), review of information submitted by pine snake experts to the Department in response to publication of the petition¹, and consultation with the Endangered and Nongame Species Advisory Committee (the advisory body formed pursuant to N.J.S.A. 23:2A-7e and N.J.A.C. 7-25-4.18 to advise the Commissioner with respect to the Endangered and Nongame Species Conservation Act (N.J.S.A. 23:2A et. seq.)).

The Northern Pine Snake was originally assigned the status of “threatened” at N.J.A.C. 7:25-4.17 in 1979 by the Department’s Division of Fish and Wildlife in response to a report commissioned by the Department that concluded that the pine snake warranted threatened status. Since that time, the list of indigenous nongame species at N.J.A.C. 7:25-4.17, which includes species status, has been amended seven times (1984, 1985, 1987, 1991, 1999, 2002 and 2003).

The Department’s initial classification of the northern pine snake as “threatened” was based on an assessment of the threats, including illegal collection and habitat loss, and not upon an estimate of population numbers and trends. This is consistent with the definition of the term “threatened” at N.J.A.C. 7:25-4.1 which states that “threatened” means a “species that may become endangered if conditions surrounding it begin to or continue to deteriorate.” The term “endangered” means “a species whose prospects for survival within the State are in immediate danger due to one or many factors: a loss of or change in habitat, overexploitation, predation, competition, disease. An endangered species requires immediate assistance or extinction will probably follow.” The regulatory definition of “threatened” is actually a component of the statutory definition of the term “endangered” at N.J.S.A. 23:2A-3 which includes “...any species or subspecies of wildlife whose prospects of survival or recruitment are in jeopardy or are likely within the foreseeable future to become so due to any of the following factors: (1) the destruction, drastic modification, or severe curtailment of its habitat, or (2) its over-utilization for scientific, commercial or sporting purposes, or (3) the effect on it of disease, pollution, or predation, or (4) other natural or manmade factors affecting its prospects of survival or recruitment within the State, or (5) any combination of the foregoing factors.” In this context, “endangered” species are those whose prospects of survival or recruitment are currently in jeopardy, while a “threatened” species are those whose prospects of survival or recruitment are likely to become in jeopardy in the foreseeable future.

Notably, these definitions make no mention of population size or trends but focus on threats to species survival and recruitment. Determining if a species meets these

definitions does not require a determination of population size as suggested by the petitioner, but can be met by examining the threats faced by the species and their likely impact on the species.

Clark et al. (Clark, Kathleen E., James E. Applegate, Lawrence J. Niles, David S. Dobkin. 2006. An Objective Means of Species Status Assessment: Adapting the Delphi Technique, Wildlife Society Bulletin 34(2):419-425) examines the listing processes used by states as part of the authors' presentation of the method used to assess species in New Jersey. Most states with state endangered species protection programs examine a wide array of information in assessing the status of wildlife species and determining which should be considered "endangered" or "threatened" (or that state's equivalent designations). Among the information considered are: species' life history, biological vulnerability, limiting factors, distribution, abundance, population trends, management need, current conservation efforts, habitat condition, and threats. The U.S. Fish and Wildlife Service uses similar information when considering species for listing under the federal Endangered Species Act (16 U.S.C.A. §§ 1531 et seq).

To assess the validity of the petitioner's criticism of the lack of northern pine snake population data, the Department reviewed the background for the U.S. Fish and Wildlife Service listing of 12 snake species as endangered or threatened². Of those 12 species, only two species recovery plans include current or projected population estimates. Of the 10 recovery plans that do not include population estimates, the following reasons are given for the species' listing (in order of frequency): habitat loss/degradation/manipulation, collection, non-native predators, roadways, fire suppression, genetics (drift or hybridization), agricultural practices, disease, inadequate regulatory mechanisms, flood control/waterway manipulation, historical trends, and pesticides.

Much of the petitioner's criticism centers on the use of the Delphi technique by the Department in determining the status of indigenous wildlife. The Department has used this investigation method since 1999 to develop recommended changes to the list of

endangered species at N.J.A.C. 7:25-4.13 and the list and status of indigenous nongame species at N.J.A.C. 7:25-4.17. The Delphi Technique is a statistically verifiable investigation process for establishing consensus of a group of experts. The panel of experts selected by the Department includes biologists both from within and from outside the Department, including members of the Endangered and Nongame Species Advisory Committee, faculty of state colleges and universities, and ecological consultants from the private sector. The panel members review the status of nongame wildlife species and share expert opinions and data through an iterative process administered by the Department. Two Department biologists and the university researcher who oversaw the first application of the Delphi process to determine species status published a description of this use in a peer reviewed scientific article³ (see Clark et al. 2006, cited above). The panelists consider available information on species population trends, productivity, survival and mortality factors, habitat requirements, and threats to populations and habitats. In the course of the iterative process, reviewers reach consensus on the status of each species, including whether the species should be classified as endangered or threatened.

In 2001, a review of the pine snake's status (along with the status of 17 other reptiles and 19 amphibians) was completed using the Delphi method. Participating in this review was a group of 16 panelists, each with expertise in reptiles and/or amphibians, including 11 panelists with specific expertise or experience with respect to northern pine snakes. Two of the panelists have published several papers on their pine snake studies in peer-reviewed journals. Panelists evaluated the existing threats and indicators of the overall health of the pine snake populations in New Jersey and reached consensus that this species still met the definition of "threatened." This finding was affirmed by the Endangered and Nongame Species Advisory Committee which recommended that the Department maintain the status of pine snakes as "threatened" after reviewing the Delphi panel results.

The petitioner asserts that the Delphi method was inappropriately applied because the Department did not utilize a principal investigator from outside the agency to ensure

limited agency influence on participating panelists. The Department believes that this criticism is based on two incorrect assumptions.

The first incorrect assumption is the existence of an agency bias either favoring or discouraging classification of species as threatened or endangered. The Endangered and Nongame Species Conservation Act (N.J.S.A. 23:2A-1, et seq.) provides the Department's Commissioner with sole responsibility for determining which species are endangered and threatened. The Department acts as an objective, independent arbiter when evaluating the scientific and other evidence relevant to species status and further subjects the findings of the Delphi panel to an independent advisory committee (the Endangered and Nongame Species Advisory Committee described above) whose meetings are open to the public. The Department has no interest in incorrectly classifying species status, as doing so would result in misallocating its limited resources for species conservation by undertaking costly regulation and management for species that are not actually at risk and thus diverting resources from those species most at risk.

The second incorrect assumption is that the Delphi process allows the principal investigator to exercise influence over the participating panelists. In practice, the principal investigator conducting the Delphi review serves solely as a data collator and summarizer who gathers the information provided by panelists in each round and provides that information back to the panelists in succeeding rounds. The principal investigator does not change the information provided by individual panelists in any way, nor does the investigator add any commentary to the panelist's information.

The petitioner also criticizes the lack of pine snake expertise among the panelists and that not all panelists provided justification for their votes. As noted above, a majority of the panelists that have been involved in the review of the status of species including the northern pine snake had experience or expertise with respect to northern pine snakes and two members have published extensively about their research on northern pine snakes. The other individuals on the panels who are not pine snake experts all had considerable expertise with reptiles and/or amphibians and nearly all also have considerable

knowledge of conservation biology, which is equally relevant to the task of determining the status of New Jersey's indigenous wildlife.

The Department believes that these two criticisms of the panelists background and justifications reflect an incomplete understanding of the way in which the Delphi technique operates. In the course of the Delphi process, panelists convey their expert opinions and those with the most expertise on the particular species include information to justify their opinions. The opinions and the supporting information inform other panelists, who have the technical capacity and expertise to evaluate the strength of information presented, to reach their own conclusions. As part of the review process, panelists also indicate their level of confidence when assigning a species' status in each round with the panelist assigning a number based upon a sliding scale of certainty from 1(unreliable) to 8 (certain). Along with the justification information provided by some panelists, all panelists are provided with information on the number of "votes" for each status and the average panelist confidence level associated with the status assignment. In reaching their own vote in the succeeding rounds, panelists therefore are not only allowed to evaluate the specific justifications, but also the relative confidence level of the panelist associated with each status receiving votes. The average level of confidence after the first round of the Delphi panel review of northern pine snake in 2001 was 6.1 which improved to 6.4 after the second round in which the panelists reached consensus (greater than or equal to 85% of panelists in agreement).

The petitioner additionally asserts that the definition of "threatened" specified in the instructions for expert panelists participating in reviewing status assessments for reptiles and amphibians under the Delphi Method is more expansive than the regulatory definition of "threatened" species set forth in N.J.A.C. 7:25-4.1. In the information packet provided to the Delphi panelists, "threatened" is defined as: "a species that may become endangered if conditions surrounding it begin to or continue to deteriorate. Thus, a threatened species is one that is already vulnerable as a result of small population size, restricted range, narrow habitat affinities, or significant population decline." The first sentence of the definition used by the Delphi panel is identical to the complete definition

provided in the Departments rules at N.J.A.C. 7:25-4.1. The difference on which the petition focuses is that the definition provided to the Delphi panelists contains an additional sentence which the petitioner assert is “more expansive.” The Department disagrees. The additional sentence included in the definition provided to the Delphi panel is purely explanatory and thus has no effect on the outcome of the Delphi panel review. .

The petitioner, and the consultant hired on behalf of the petitioner, suggest alternatives that might be used to evaluate the population status of pine snakes in New Jersey, and the petitioner contends that these methods could have been utilized in addition to the Delphi method; methods include Population Viability Analysis (PVA) and Occupancy Models.

In the pine snake report submitted by the petitioner, however, the author of the report summarizes his discussion on PVA by dismissing potential use of the PVA to inform the Department’s evaluation of pine snakes. The petitioner’s consultant’s report admits the following regarding the use of PVA: “Unfortunately, so little information exists on any of these needed [life-history] parameters for the Pine Snake that it is impossible to gain any insights into how the species will respond to changes in the landscape.” The Department agrees with the petitioner’s consultant that the quantitative life-history data needed to carry out a PVA for pine snakes (or most other species for that matter) are not currently available. Furthermore, the level of resources needed to obtain this information in sufficient quantity to conduct the analysis make it unrealistic that the Department would be in a position to conduct the novel research necessary to collect such detailed life-history data for this species.

While the theoretical possibilities of the petitioner’s proposed Occupancy Models are intriguing, similar to the PVA method, the extensive data collection efforts that would be required to run these models effectively for pine snakes limits their applicability. The petitioner’s consultant admits that several years of additional pine snake surveys of a large number of sites, over a broad area, encompassing a variety of habitat types, and during multiple times of the year would be necessary to accurately run this type of analysis. Surveys on the scale, and of the required intensity, that would be needed to even attempt this sort of modeling for pine snakes would quickly exhaust the already limited funding available for rare species research within the State. The Department currently lists 73 animal species as

threatened or endangered in New Jersey. Proper management of these species requires prudent budgeting of the Department's limited funding for rare species research and management. It would therefore be imprudent for the Department to invest such an excessive amount of resources into a modeling approach (with questionable applicability for New Jersey's pine snake population due to its non-contiguous distribution in the State⁴) for a single species and thereby neglect the funding needs of the remaining 72 listing species.

The Department believes that, taking into account the resources available to make such determinations, the Delphi approach is among the most efficacious and objective means available to tackle the continuing task of determining the status of hundreds of wildlife species indigenous to New Jersey. As discussed in the Clark, et. al article, the Delphi method combines many of the best aspects of current methods, those that use expert opinions, and those that attempt to quantify population trends and threats to species. As Clark et al note, others have found the anonymous, controlled-feedback method advantageous because it makes group estimates more accurate than the estimates resulting from face-to-face discussions and, when applied in complex issues, it allows participants time to consider the questions. The Delphi method will therefore continue to be among the "investigations concerning wildlife" that the Department is required to conduct pursuant to N.J.S.A. 23:2A-4.a.

Contrary to the assertion that the Delphi method somehow favors classification of species as threatened or endangered, the Department notes that the use of the Delphi technique has not only resulted in proposals or amendments to N.J.A.C. 7:25-4.13 and 4.17 that maintained current conservation status, as with the northern pine snake, or to list species as "endangered or "threatened," but also in proposals and amendments to "delist" or "downgrade" conservation status from "endangered" to "threatened" or from "threatened" to a lesser conservation status. For example, as a result of the same Delphi review to which the petitioner objects, the status of Pine Barrens treefrog (*Hyla andersonii*) was amended from "endangered" to "threatened." (see 34 N.J.R. 2405(a); 35 N.J.R. 1669(a)) As a result of the Delphi review conducted for birds referenced in the Clark et. al article, the Department amended the status of the Great Blue Heron (*Ardea*

herodias) and Cliff Swallow (*Petrochelidon pyrrhonota*) from “threatened” to “stable.” (see 31 N.J.R. 580(a); 31 N.J.R. 1923(b)) Based on a more recent Delphi review of birds, the Endangered and Nongame Species Advisory Committee has recommended amending the status of the Cooper’s hawk from “threatened” to “special concern.”

The Department expects to conduct a Delphi panel review of reptiles, including the northern pine snake, within the next two to four years and will include the information provided by the petitioner among the information it considers along with any other relevant information the petitioner and others may provide.

While the petition includes criticisms of the mechanisms that the Department uses to determine species status, and suggests other methods it believes would be more appropriate, the principal criticism of the petitioner revolves around its belief that scientific data do not support the continued listing of the pine snake as “threatened.”

To address petitioner’s assertions, the Department undertook, during the 90-day period that the petition for rulemaking was referred for further deliberation, an assessment of whether in its evaluation of the status of the pine snake the Department reached an erroneous conclusion, or whether, since the last evaluation, conditions have changed such that the pine snake no longer warrants listing as threatened in New Jersey and presented the results of that assessment to the Endangered and Nongame Species Advisory Committee.

The Department’s assessment, entitled “Status Assessment of the Northern Pine Snake (*Pituophis m. melanoleucus*) in New Jersey: An Evaluation of Trends and Threats,” ([see http://www.nj.gov/dep/fgw/](http://www.nj.gov/dep/fgw/)) reveals that pine snakes and their habitats are facing numerous threats in New Jersey and throughout the remainder of their US range (NJDFW, 2009, Status Assessment of the Northern Pine Snake (*Pituophis m. melanoleucus*) in New Jersey: An Evaluation of Trends and Threats). These threats include habitat loss and fragmentation, illegal collection, natural and subsidized

predators, impacts from roads, habitat change resulting from fire suppression, impacts from off-road vehicles, and population isolation.

In the report provided by the petitioner, the US distribution of pine snakes is described as “very fragmented.” While the Department agrees with this general description, the petitioner failed to highlight that the New Jersey population of pine snakes is totally isolated from all other pine snake populations in the country and that this isolation has increased from historic levels. New Jersey’s pine snakes are extremely isolated, with roughly 645 km (400 mi) separating them from the next closest known pine snake population, which is located in southern North Carolina. As noted in the Department’s assessment, populations with this type of distribution are inherently at greater risk than populations with more continuous distributions. This pattern of distribution also makes it virtually impossible that New Jersey would be re-colonized naturally if the State’s portion of the U.S. population was extirpated. Results of the Department’s investigation suggest that this regional isolation of New Jersey’s pine snake population has increased from historic levels (even within the past 25 years), as range reductions (including suspected extirpations in West Virginia and Virginia) have taken place within nearly all states in which this species historically occurred. South Carolina is the possible exception, where the distribution appears to have remained unchanged. Furthermore, in all states where pine snakes are known to exist, they are given an elevated conservation status (priority/imperiled species, S2, special concern, or threatened). The petitioner inaccurately declares that no states, other than New Jersey, provide the northern pine snake with a “threatened” status. The Department’s research revealed that pine snakes are, in fact, listed as threatened in Tennessee, and their elevated status in all other states suggests that threats for this species are widespread throughout the United States.

The Department’s assessment analysis estimates that northern pine snakes have lost roughly 15,000 hectares (37,050 acres) of habitat in New Jersey directly to development between 1986 and 2007. The Department’s Land Use Land Cover data demonstrates ongoing development within the pine snake’s range within the past two decades. The petitioner takes the position that land preservation and protection within the pine snake’s

New Jersey range are sufficient to prevent further deterioration of pine snake habitat. The Department's findings do not support this position. Instead, available information shows that the loss and fragmentation of pine snake habitat has continued in the midst of land preservation and land protection efforts between 1986 and 2007. Furthermore, the Department's findings suggest that most other threats to pine snakes operate independently of land preservation or protection.

Open space efforts have successfully preserved nearly 37% of the habitat within the pine snake's historic New Jersey range and anywhere from 54% to 60% of pine snake habitat modeled using 2007 Land Use Land Cover data (NJDFW, 2009; Status Assessment of the Northern Pine Snake (*Pituophis m. melanoleucus*) in New Jersey: An Evaluation of Trends and Threats). Despite this high level of land preservation, the Department reports losing 6.5% - 7.0% of total pine snake habitat to development between 1986 and 2007. Illegal collecting and off-road-vehicle (ORV) activities impact the nesting success of pine snakes and remove adult and juvenile snakes from the population. These threats are believed to be widespread, even on preserved State and federal lands due to unlimited public access and appear to have increased in recent years. Pine snake mortality along roads and the isolating effects that roads have on snake populations can also operate independently of land preservation and adversely affect pine snakes by removing individuals from the population and by dividing the population into smaller fragments. A recent study of the impact of roads on snakes⁵ combined with the Department's analysis of recent daily traffic data has lead the Department to conclude that at least four major roads (Garden State Parkway, Atlantic City Expressway, Route 30, and Route 322) almost certainly create complete barriers to pine snake movement, and therefore divide pine snakes in New Jersey into five discrete populations that do not intermix (as traffic volumes increase with time, additional roads may become complete barriers to movement). Predation, including predation by subsidized predators (predators whose populations benefit from the intentional or accidental provision of food and/or shelter by humans), also poses a threat to pine snakes independent of State land preservation, and the Department believes that predation by subsidized predators is probably increasing in areas near human development. Finally, fire suppression efforts are widespread on public lands and are likely changing the vegetative community towards a condition that is unfavorable to pine snakes. As described in the

Department's assessment, many of these threats are empirically increasing (for example, habitat loss and fragmentation, and the impacts of roads) or very likely to be increasing (for example, predation and habitat change due to fire suppression) in New Jersey and therefore pine snakes (and their habitat) are almost certainly at greater risk now than historically.

Therefore, while land preservation efforts have protected a portion of pine snake habitat and may have reduced some of the threat posed by development in specific areas, the Department disagrees with the petitioner's assertion that these efforts alone will prevent future deterioration of pine snake habitat in New Jersey.

The petitioner makes no assertion that the initial listing of the northern pine snake as "threatened" in 1979 was incorrect and provides no substantive evidence that populations have increased since then. There is no evidence to suggest, and no reason to believe, that current population densities are higher than those that existed in 1979. Further, the Department's assessment has demonstrated that thousands of acres of pine snake habitat have been lost since 1979. Thus, it is reasonable to conclude that pine snake populations have actually declined since their initial listing as "threatened" in 1979.

A major consideration in any determination of the endangered or threatened status of a species population is the sufficiency of existing programs to adequately ensure populations are able to sustain themselves successfully. The principal management programs that the Department expects to continue to implement in aiding the recovery of northern pine snakes include: land conservation and management, implementation of the land use regulations that include protections for endangered and threatened species habitats, permitting programs for possession and scientific collection, and enforcement programs against illegal activities, such as poaching. The Department is currently engaged in landscape-scale habitat management planning that, if and when implemented, holds some promise for improving habitat conditions for pine snakes. The Department believes, however, based on its assessment of threats, that these programs are likely insufficient to ensure that the pine snake will not become endangered in the future.

Based on our current understanding of the adverse genetic effects of population, the Department believes that the continued isolation of the New Jersey pine snake population from the rest of its North American range will remain a principal element influencing the status of northern pine snake in New Jersey. Further, while the Department expects that resources will continue to be available to acquire important habitat areas, the Department's assessment has shown that many other factors detrimental to pine snake populations are or likely are worsening. Resources to address these factors are much more limited. Currently there are no programs to mitigate the negative impacts of the existing road system on pine snakes, which divides the state's pine snakes into five or more genetically isolated population segments and is a significant source of mortality for snakes. Resources for enforcement against poaching activities and illegal ORV use are likely to continue to remain limited.

Therefore, in accordance with N.J.S.A. 52:14B-4(f) and N.J.A.C. 1:30-4.2, after careful consideration of the petition, the Department has determined to deny the petition for rulemaking.

A copy of this notice has been mailed to the petitioner as required by N.J.A.C. 1:30-4.2.

DATE

Mark N. Mauriello
Acting Commissioner
Department of Environmental Protection

¹ The Department received comments from three pine snake experts in response to the publication of the petition to "delist" the northern pine snake: Joanna Burger, PhD. Received November 24, 2009 entitled, "Statement of Dr. Joanna Burger." 8 pp.; James Spotilla, PhD., entitled, "Comments on Petition to Delist the Northern Pine Snake." Received October 16, 2009. 13 pp.; Robert T. Zappolorti, - Herpetological Associates, Inc., letter dated November 13, 2009. Received November 24, 2009. 23 pp.

² The following USFWS recovery plans were examined:

U.S. Fish and Wildlife Service. 1984. Mona Boa (*Epicrates monensis monensis*) Recovery Plan. U.S. Fish and Wildlife Service, Atlanta, Georgia. 14 pp.;

U.S. Fish and Wildlife Service. 1986. Puerto Rican Boa (*Epicrates inornatus*) Recovery Plan. U.S. Fish and Wildlife Service, Atlanta, Georgia. 21pp.;

U.S. Fish and Wildlife Service. 1986. Virgin Islands Tree Boa (*Epicrates monensis granti*) Recovery Plan. U.S. Fish and Wildlife Service, Atlanta, Georgia. 26 pp.;

U.S. Fish and Wildlife Service. 1985. New Mexico Ridgenose Rattlesnake (*Crotalus willardi obscurus*) Recovery Plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico, iii + 59 pp.;

U.S. Fish and Wildlife Service. 1993. Atlantic Salt Marsh Snake (*Nerodia clarkii taeniata*) Recovery Plan. Atlanta, Georgia. 19 pp.;

U.S. Fish and Wildlife Service. 1993. Concho Water Snake (*erodia paucimaculata*) Recover Plan. Albuquerque, New Mexico. Vii + 66 pp.;

U.S. Fish and Wildlife Service. 2008. Northern Population Segment of the Copperbelly Water Snake (*Nerodia erythrogaster neglecta*) Recovery Plan. Fort Snelling, Minnesota.

ix + 79 pp.;

U.S. Fish and Wildlife Service. 1982. Eastern indigo snake (*Drymarchon corais couperi*) recovery plan. U.S. Fish and Wildlife Service, Atlanta, Georgia. 23 pp.;

U.S. Fish and Wildlife Service. 1999. Draft Recovery Plan for the Giant Garter Snake (*Thamnopsis gigas*). U.S. Fish and Wildlife Service, Portland, Oregon. ix + 192 pp.;

U.S. Fish and Wildlife Service. 2003. Lake Erie Watersnake (*Nerodia sipedon insularum*) Recovery Plan. U. S. Fish and Wildlife Service, Fort Snelling, MN. 111 pp.

U.S. Fish and Wildlife Service, 1985. Recover Plan for the Sand Francisco Garter Snake (*Thamnophis sirtalis tetrataenia*). U.S. Fish and Wildlife Service, Portland, Oregon. 77 pp.;

U.S. Fish and Wildlife Service. 2002. Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California. Region 1, Portland, OR. xvi + 306 pp.

³ The following is taken from the Wildlife Society Bulletin at the time that the Clark et. al article was submitted for publication:

"All technical information published in the *Wildlife Society Bulletin* has been selected through peer evaluation. Articles identified as peer refereed are selected from manuscripts that have been subjected to rigorous review by 2-4 independent referees, an Associate Editor, and the Editor. Articles identified as peer edited have been evaluated and selected by an Editorial Panel of academicians and resource professionals performing more rapid review of content to expedite dissemination of timely resource information. Material in other features and departments not labeled with an evaluation tag is selected and edited by the *Bulletin* staff. To be published in the *Bulletin*, manuscripts must meet the criteria of broad applicability and technical merit established by The Wildlife Society and the *Bulletin* editorial process. The opinions expressed by the authors do not necessarily reflect those of The Wildlife Society. Mention of products within articles does not constitute endorsement by The Wildlife Society."

⁴ James Spotilla, PhD., entitled, "Comments on Petition to Delist the Northern Pine Snake." Received October 16, 2009. 13 pp.

⁵ Andrews, KM and JW Gibbons. 2005. How Do Highway Influence Snake Movement? Behavioral Responses to Roads and Vehicles. *Copeia* 2005: 772-782.