

TIMBER RATTLESNAKE STATUS CHANGE COMMENT/RESPONSE DOCUMENT

The Pennsylvania Fish and Boat Commission (PFBC) published a notice of proposed rulemaking at 45 Pa. B. 6691 (November 21, 2015), seeking public comments on an amendment to 58 Pa. Code §§ 75.3 (relating to candidate species) that removes the Timber Rattlesnake from the Candidate species list. The public comment period was November 21, 2015 through December 21, 2015. During this comment period, the PFBC received 73 comments: two comments support the proposal, and 71 comments oppose it. The PFBC received over 2200 comments after the formal comment period opposing the proposal. Most of the late comments were email form letters generated from a posting on the Center for Biological Diversity's website. Copies of the public comments have been provided to the Commissioners. PFBC staff reviewed the public comments that were received and distilled them into this single response document. Comments that were duplicative, irrelevant to the proposed rulemaking or vague were not included in the comment/response. Some comments were combined or generalized for purposes of providing a response, and some comments were edited for length, clarity, relevance or format. Headings were added below for comments of similar nature. Comments received after the public comment period were considered, but they did not raise any substantive issues that had not been previously raised by comments received during the comment period. Therefore, this Comment/Response Document comprehensively addresses all issues associated with the proposed rulemaking.

RECLASSIFICATION PROCESS

1. Comment: Commenter (R. Everett) had concerns about the application of listing/delisting criteria. Commenter asked for PFBC to describe how the Timber Rattlesnake did not meet candidate status criteria.

Response: The PFBC processed data obtained from the PFBC's Timber Rattlesnake Site Assessment and Inventory project, as well as Pennsylvania Natural Diversity Inventory data, and any other pertinent records through Candidate Species Criteria Analysis.

The listing criteria are based on the International Union for Conservation of Nature (IUCN) method that has been peer-reviewed and published (<http://www.iucn.org>). A Wild Resources Conservation Fund grant funded a study conducted by the president of the Pennsylvania Biological Survey (PABS), Jerry Hassinger (2005), which examined existing regulatory listing criteria. PABS is a nonprofit scientific, educational and advisory organization that was formed to foster the perpetuation of the natural biological diversity of the Commonwealth. It has a number of technical committees, including committees for fish, reptiles and amphibians and mussels, and those committees serve in an advisory role to the PFBC's staff. Members of the PABS technical committees are recognized experts in their taxonomic fields.

The "Hassinger Report" modified the existing IUCN criteria for use in Pennsylvania, and PFBC staff accepted the IUCN method as modified. Pennsylvania's modifications were based on Florida's modifications. Florida adopted the IUCN criteria for use within its political boundaries. Some of the Pennsylvania modifications were unique. For example, the PFBC added the petition and documentation process that is not in the IUCN method. The PABS Technical Committees further peer reviewed and refined the criteria to account for regional and taxonomic differences of the different floral and faunal groups. See table below for Pennsylvania Imperiled Herpetofauna Species Listing Criteria used by the PFBC.

Unlike most states, which rely solely on expert opinion when making listing decisions, the PFBC's listing method includes both quantitative objective criteria (modified IUCN method) and expert opinion, which assesses threats and endangerment and also includes peer review. The objective criteria are used as a tool

to assist in the process for listing but are not the final arbiter in the process. Professional judgment also plays a significant role in making the final listing or delisting decisions.

This method of listing/delisting was adopted by the PFBC in 2007, and has been applied with over 30 species listings (additions) and delistings (removals) from the PFBC's lists of Endangered, Threatened and Candidates Species set forth in 58 Pa. Code §§ 75.1, 75.2 and 75.3. Also note that this analysis is applied to the statewide Timber Rattlesnake population, not individual or regional populations. One or more major criterion (A, B, C, or D) need to be met to qualify for Candidate status.

The preamble of the notice of proposed rulemaking summarizes the criteria used to determine species status and removal from the Candidate list. The notice of proposed rulemaking also summarizes the justifications of the proposed action. Documentation was prepared for the Timber Rattlesnake and discussed at length by PABS in the species status change/documentation form. The PABS vote supported the status change, and PFBC staff recommended to the PFBC's Board of Commissioners that the Candidate designation be removed. See below for details on the criteria and how the Timber Rattlesnake does not meet specific criteria.

PABS Amphibian and Reptile Technical Committee adaptation of IUCN Red List Categories and Criteria Version 3.1

Role of different criteria

For listing as Endangered, Threatened, or Near Threatened there is a range of quantitative criteria; *meeting any one* of these criteria qualifies a taxon for listing at that level of immediate concern. Each taxon should be evaluated against all the criteria. Even though some criteria will be inappropriate for certain taxa (some taxa will never qualify under these however close to extinction they come), there should be criteria appropriate for assessing immediate concern levels for any taxon. The relevant factor is whether *any one* criterion is met, not whether all are appropriate or all are met. Because it will never be clear in advance which criteria are appropriate for a particular taxon, each taxon should be evaluated against all the criteria, and *all* criteria met at the highest immediate concern category must be listed.

* Not a category recognized by PA agencies. For PABS use only. GENERAL CRITERIA	PABS IMMEDIATE CONCERN CATEGORIES		
	ENDANGERED	THREATENED	NEAR THREATENED*
	SPECIFIC CRITERIA	SPECIFIC CRITERIA	SPECIFIC CRITERIA
<p>A. <u>Population reduction</u> in the form of either of the following:</p> <p>1) An observed, estimated, inferred or suspected population reduction of ___% over the previous 20 years or four generations, whichever is longer, based on and specifying any of the following:</p> <ul style="list-style-type: none"> a) direct observation b) an index of abundance appropriate to the taxon c) a decline in area of occupancy, extent of occurrence and/or quality of habitat d) actual or potential levels of exploitation e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites. 	<p>≥ 80% in last 20Y or 4 G</p>	<p>≥ 50% in last 20Y or 4 G</p>	<p>≥ 20% in last 20Y or 4 G</p>
<p>2) A population reduction of at least ___% projected or suspected to be met within the next 10 years or 3 generations, whichever is longer, based on and specifying any of b), c), d) or e) above.</p>	<p>≥ 80% in next 10Y or 3 G</p>	<p>≥ 50% in next 10Y or 3 G</p>	<p>≥ 20% in next 10Y or 3 G</p>
Continued	ENDANGERED	THREATENED	NEAR THREATENED

GENERAL CRITERIA	SPECIFIC CRITERIA	SPECIFIC CRITERIA	SPECIFIC CRITERIA
B. 1) Extent of occurrence estimated to be less than ___square miles or	<40 sq. mi.	<2,000 sq. mi.	<7,700 sq. mi.
2) Area of occupancy estimated to be less than ___ square miles, and	<4 sq. mi.	<200 sq. mi.	<770 sq. mi.
estimates indicating any two of the following:			
a) Severely fragmented or known to exist at ___location(s)	1 location	≤5 locations	≤10 locations
b) Continuing decline, observed, inferred or projected in any of the following: (1) extent of occurrence (2) area of occupancy (3) area, extent and/or quality of habitat (4) number of locations or subpopulations (5) number of mature individuals (6) reproduction and recruitment of mature individuals into population	Qualified decline, any rate	Qualified decline, any rate	Qualified decline, any rate
c) Extreme fluctuations in any of the following: (1) extent of occurrence (2) area of occupancy (3) number of locations or subpopulations (4) number of mature individuals	Qualified extreme fluctuations	Qualified extreme fluctuations	Qualified extreme fluctuations
Continued	ENDANGERED	THREATENED	NEAR THREATENED

GENERAL CRITERIA	SPECIFIC CRITERIA	SPECIFIC CRITERIA	SPECIFIC CRITERIA
C. 1) Population estimated to number fewer than ___ mature individuals and either:	<250	<2,500	<10,000
a) An estimated continuing decline of at least ___% within ___ years or ___ generation(s), whichever is longer, or	Decline $\geq 25\%$ in 3Y or 1G	Decline $\geq 20\%$ in 5Y or 3G	Decline $\geq 10\%$ in 10Y or 3G
b) A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either: (1) severe fragmentation (that is, no subpopulation estimated to contain more than ___ mature individuals) (2) all individuals are in a single subpopulation	Decline, any rate plus all sub-pops ≤ 50 or all in one sub-pop.	Decline, any rate plus all sub-pops ≤ 250 or all in one sub-pop.	Decline, any rate plus all sub-pops $\leq 1,000$ or all in one sub-pop.
D. 1) Population estimated to number fewer than ___ Individuals.	<50	<250	<1,000
2) Population is characterized by an acute restriction in its area of occupancy (less than 40 square miles) or in number of locations (less than 5).	(not applicable)	(not applicable)	Area of occupancy <40 sq mi or number of locations <5
E. Quantitative analysis showing the probability of extinction in the wild is at least ___% within ___ years or ___ generations, whichever is longer	50% in 10Y or 3G	20% in 20Y or 5G	10% in 100Y

Criteria Analysis – Timber Rattlesnake for Candidate Status

CRITERIA A.

A.1.a.

Results of the 12-year Timber Rattlesnake assessment in conjunction with monitoring of hunt data and other research indicate that many populations are recovering from overhunting pressures, the distribution across the state remains much the same within the past 25 years, and more than half of the documented populations remain stable or increasing. Generation length for this species was calculated as: $1/\text{adult mortality} + \text{age at first reproduction}$. Adult mortality for Timber Rattlesnake is estimated to be at approximately 30 years. Age at first reproduction is approximately 6 years (Reinert 2005). The generation length is therefore 6.03, or 6 years. Four generations is therefore 24 years. The population appears to be increasing or stable (Gipe and Urban 2015). This criterion is not met.

A.1.b.

No index of abundance for this species has been created. Abundance data is difficult (time, labor, and expensive) to obtain for most species, and therefore, this criterion is often not used.

A.1.c.

A decline in area or occupancy, extent of occurrence or quality of habitat within the past 20 years or four generations has not been observed. Results of the 12-year Timber Rattlesnake assessment in conjunction with monitoring of hunt data and other research indicate that many populations are recovering from overhunting pressures, the distribution across the state remains much the same within the past 25 years, and more than half of the documented populations remain stable or increasing (Gipe and Urban 2015). The population appears to be increasing or stable. This criterion is not met.

A.1.d.

Compared to historic levels of exploitation (e.g., bounties, etc.), levels of exploitation of this species have declined over the past 20 years due to changes in regulations, education, and law enforcement (Gipe and Urban 2015). This criterion cannot be justified and, therefore, is not met.

A.1.e.

The effects of introduced taxa on the Timber Rattlesnake within the past 20 years are not known, but are not suspected to have been detrimental. Recently, fungal dermatitis has been raised as a concern in the northeast states. While suspected to occur here, to date, the actual disease pathogen has not been documented in Pennsylvania. However, several Pennsylvania researchers and Timber Rattlesnake enthusiasts believe this disease has been around the Commonwealth for at least the last 30 years, with little or no effect on populations (H. Reinert, J. Chestney, M. Martin, personal communication). It has yet to be determined how prevalent this disease is in the Pennsylvania Timber Rattlesnake population and if it poses any threat to the Timber Rattlesnake. This criterion is not met.

A.2.

A.2.b.

No index of abundance for this species has been created. Abundance data is difficult (time, labor, and expensive) to obtain for most species, and therefore, this criterion is often not used.

A.2.c.

The stability of the range and populations of the Timber Rattlesnake indicated in A.1.a. above do not lead to projected declines in the next 10 years. Since 2003, 996 new sites (mostly gestation sites) found within PFBC site assessment project (2003-2015) suggest that the data compared to historical vouchered data has actually expanded its range. It is likely that Timber Rattlesnakes were already occurring in these locations, but significant effort used to detect them confirmed their presence. This criterion has not been met.

A.2.d.

Threats to habitat are ever-changing, but given the high number of Timber Rattlesnake

occurrences on public lands (75%), it may be managed through education and management of the species and its habitat on public lands. In the past decade, encroachment by oil and gas development into Timber Rattlesnake strongholds has increased substantially, but the extent of the threat to populations and extent of occurrence has not been quantified. A recent study focused on the potential impacts of Marcellus and Utica Shale energy development on Timber Rattlesnakes in state forest is underway (Rocco et al. 2013), but is inconclusive to date and now is affected by the recent slowdown in shale development and production in northcentral Pennsylvania.

A.2.e.

See A.1.e above.

CRITERIA B.

B.1.

The estimated extent of occurrence of the Timber Rattlesnake is greater than 15,571 square miles, based on extensive survey data. This criterion has not been met.

B.2.

The estimated area of occupancy of the Timber Rattlesnake is from 9,000 to 15,571 square miles, based on extensive survey data. This criterion has not been met.

B.2.a.

1,159 active sites were detected in the 12-year PFBC study. The range of the Timber Rattlesnake in Pennsylvania is fragmented in some areas, particularly on the edges of its range but large extents of contiguous populations remain throughout many of these fragments. This criterion has not been met.

B.2.b.1.

Results of the 12-year Timber Rattlesnake assessment in conjunction with monitoring of hunt data and other research indicate that many populations are recovering from overhunting pressures, the distribution across the state remains much the same within the past 25 years, and more than half of the documented populations remain stable or increasing. This criterion has not been met.

B.2.b.2.

Results of the 12-year Timber Rattlesnake assessment in conjunction with monitoring of hunt data and other research indicate that many populations are recovering from overhunting pressures, the distribution across the state remains much the same within the past 25 years, and more than half of the documented populations remain stable or increasing. This criterion has not been met.

B.2.b.3.

The project summary reported 1,654 sites had been assessed for the project (2003-2012), resulting in 36% of the sites considered high quality sites, 34% of the sites represent medium to lower quality sites, and 30% of the sites were rated as historic or unoccupied at the time of the surveys (70% of total sites were occupied). Large portions (estimated 20-50%) of the Timber Rattlesnake range remain unsurveyed due to lack of landowner permissions or access difficulty. This criterion has not been met.

B.2.b.4.

See B.2.b.3. This criterion has not been met.

B.2.b.5.

Few intense mark-recapture studies that can report population sizes are conducted on Timber Rattlesnakes, a notoriously difficult animal to recapture due to large home ranges and multi-year reproductive patterns. One recent study on a relatively stable population in Pennsylvania estimated approximately 600 adult and older sub-adult snakes in the study area, using 11 known overwintering sites (estimated density of 40.9-77.5 snakes/den) (Reinert et al. 2011). Semi-annual monitoring by the PFBC since 2005 of 14

gestation areas distributed across the Commonwealth has resulted in 1,007 *C. horridus* marked, with very low recapture rates (<4%), potentially indicating high population densities (PFBC 2012) This criterion has not been met.

B.2.b.6.

In addition to regular reports from the field of observations of mating, gestating, and birthing Timber Rattlesnakes, 65% of the occupied sites assessed during the site assessment project documented the presence of gravid females, neonates, or juvenile Timber Rattlesnakes, and an additional 20% of occupied sites had snakes that were not examined for their reproductive status (PFBC 2012). This criterion has not been met.

B.2.c.

B.2.c.1.

Data do not indicate extreme fluctuations. This criterion has not been met.

B.2.c.2.

Data do not indicate extreme fluctuations. This criterion has not been met.

B.2.c.3.

Data do not indicate extreme fluctuations. This criterion has not been met.

B.2.c.4.

Data do not indicate extreme fluctuations. This criterion has not been met.

CRITERIA C.

Using the 1,159 occupied sites from the 12-year study and the average of 6 Timber Rattlesnakes observed per occupied site, a conservative population estimate for these sites is 7,000 Timber Rattlesnakes, with a high range estimate of 86,835 (using the maximum observed of 75 snakes at a site). An estimated 20-50% of their range where appropriate habitat exists was not sampled due to site access limitations. If we were to assume that Timber Rattlesnakes were present at these sites, as a conservative estimate we would increase the sites by 232 sites, which equates to a range estimate of 8,132 to 104,325 snakes. If we were to take the middle of this range as a gross estimate of the statewide population (56,229 snakes), this criterion has not been met. Note that this is a highly conservative estimate. It is conceivable that there are much higher numbers than this. Most of these occupied sites are gestation sites. W. H. Martin (personal communication) suggests that snakes observed at gestation sites represent only a fraction (15-40%) of the local population that is detectable. Either way, the criterion has not been met.

C.1.a.

The overall criterion has not been met.

C.1.b.

C.1.b.1.

The overall criterion has not been met.

C.1.b.2.

The overall criterion has not been met.

CRITERIA D.

D.1.

Using the 1159 occupied sites from the 12-year study and the average of 6 Timber Rattlesnakes observed per assessment, a conservative population estimate for these sites is 7,000 Timber Rattlesnakes, with a high range estimate of 86,835 (using the maximum observed of 75 snakes at a site). This criterion has not been met.

D.2.

The estimated area of occupancy of the Timber Rattlesnake is from 9,000 to 15,571 square miles, based on extensive survey data. The criterion has not been met.

CRITERIA E.

Compared to historical or vouchered (museum) data, the population appears to be expanding. Data do not indicate a high probability of extinction. This criterion has not been met.

2. Comment: Commenter (P. Dunning) expressed concerns about exploitation risks if species removed from the Candidate list. Commenter requested an explanation of what Candidate status means and what regulatory changes will take place (if any).

Response: Candidate species are defined in the PFBC's regulations as "species which could achieve endangered or threatened status in the future." 58 Pa. Code § 75.3. Candidate species are subject to seasons, size, creel—bag—and possession limits specified in the PFBC's regulations, and a person who catches them is encouraged to release them immediately and unharmed to the waters or other area from which they were taken.

The exploitation of the Timber Rattlesnake is not expected to increase as a result of removing the species from the Candidate list. In addition to being listed as a Candidate species by the PFBC, the Timber Rattlesnake has been protected by other PFBC regulations. Specifically, 58 Pa. Code § 79.3 establishes a season, possession, and annual limit for the Timber Rattlesnake. In 1993, the PFBC established a season for Timber Rattlesnakes (second Saturday in June to July 31) and a possession and annual limit of 1. In 2007, the PFBC imposed a gender and size limit (males only, must be at least 42 inches in length, measured lengthwise along the dorsal surface from the snout to the tail, excluding the rattle, and must possess 21 or more subcaudal scales). After extensive study, in 2007, the South Mountain population was found to be in severe decline, and as a result, the PFBC prohibited collection in this area (*i.e.*, it is unlawful for a person to hunt, take, catch or kill Timber Rattlesnakes west of Route 15 and south of Interstate 81 to the Maryland line where there is no open season). All of these regulations will remain in effect after the Timber Rattlesnake is removed from the Candidate list.

From a statewide status perspective, PFBC staff view Candidate species as being in a "study" status until a Threatened or Endangered classification can be identified or removal from the Candidate list can be determined through a thorough statewide (not regional) assessment of the species in question. Statewide assessments vary by species, and the scale and effort of the study is dependent on the range of the species. Most assessments occur over 2-3 field seasons. Given the large range of the Timber Rattlesnake in Pennsylvania (occurring in more than 50 counties), the effort was significant (well over 30,000 logged volunteer hours and hundreds of PFBC staff hours) across a 12-year time period.

Exploitation risks will be avoided and minimized through use of species data. The project review and resolution process that has been in place for the last 15 years will continue, even with the removal of Candidate status of the Timber Rattlesnake from section 75.3. The PFBC belongs to the Pennsylvania Natural Heritage Program (PNHP), which is a statewide partnership among state and federal natural resource agencies that have state and federal statutory mandates to protect species of Pennsylvania. The PFBC submits data collected on Timber Rattlesnake critical habitats (confirmed gestation and denning habitats) into the PNHP's Pennsylvania Natural Diversity Inventory (PNDI) database, which is a statewide storehouse for Species of Concern data. Developers interested in earth-moving projects must consult this database when obtaining Pennsylvania Department of Environmental Protection (PADEP) permits for earth-moving activities. Projects proponents that are found to have potential impacts to Timber Rattlesnakes critical habitats must contact the PFBC to resolve the conflicts. Project resolutions vary from having to do nothing to implementing best management practices, such as conducting habitat surveys to see if the habitat exists on site, presence-inferred absence surveys of gestation sites or denning sites, having a rattlesnake monitor onsite to remove Timber Rattlesnakes out of harm's way and to protect workers onsite, to case-by-case modification of projects to accommodate protections of the Timber Rattlesnake or its critical habitat. After the removal from the Candidate list, the PFBC will continue to

track and respond to the same potential Timber Rattlesnake species conflicts and recommend implementation of the same avoidance, minimization, and mitigation best management practices as occurs now when listed as a Candidate species.

POPULATION AND MONITORING

3. Comment: Numerous commenters (B. Bielema, C. Singh, C. Peeling, C. Thon, D. Schneider, P. Dunning, M. McCort, G. MacGregor, G. Thornbloom, T. Root, M. Torocco, P. Smith-Blackwell, G. Pisani, J. Rhoads, J. Eckley, M. Eckley, M. Wilson, T. Bickhart, W. Birkhead, R. Everett, R. Stechert, H. Reinert, S. Boder) **indicated a concern about the PFBC’s lack of a defined population monitoring plan and comprehensive conservation plan as outlined in the PFBC’s Species Action Plan (SAP). The PFBC was asked to describe the Timber Rattlesnake SAP and the status of these two plans.**

Response regarding comprehensive conservation plan: The Timber Rattlesnake Species Action Plan (SAP) (PFBC 2011) was developed in 2011 to “Provide an initial five year blueprint for the actions needed to attain near-term and, ultimately, long-term goals for the conservation and recovery of the timber rattlesnake.” The goal of the Timber Rattlesnake SAP, as well as other PFBC Species Action Plans, is to recover and sustain the species in Pennsylvania. The plan includes basic natural history of the species, distribution and management status in Pennsylvania, threats, and conservation and recovery of the species. See the Timber Rattlesnake SAP link: <http://fishandboat.com/water/amprep/species-plan-timber-rattlesnake.pdf>

Under the “Conservation and Recovery” section of the Timber Rattlesnake SAP, the PFBC outlines the numerous tasks for focus in the 5-year time frame. Note that many of these tasks do not need to be completed as part of the listing analysis and are therefore not relevant to the classification change. Brief status updates are given to show the breadth of the PFBC Timber Rattlesnake program:

- 1) Compile state-wide location data of viable timber rattlesnake populations.
 - a. Complete the PFBC survey of historic timber rattlesnake sites.
 - b. Investigate statewide gap areas for the presence of timber rattlesnakes.

Status of task(s): This task has been mostly completed, but is ongoing. A database has been developed and populated; the survey of historic sites has been completed. Surveys of statewide data gaps have been ongoing for the last 10 years and continue. Over 100 assessments are conducted annually.

- 2) Identify and prioritize timber rattlesnake populations that are currently being threatened by anthropogenic activities.

Status of task(s): This task has been mostly completed, but is ongoing. As Timber Rattlesnake critical habitat sites have been visited, they have been given quality ranks. These quality ranks reflect the quality, condition, viability, and defensibility of the site. We have used these quality ranks to prioritize sites that are in need of habitat management and in the threats analysis. This is an ongoing process, as we continue to locate new sites in the continuing data gap analysis, we will continue to rank and prioritize sites for management.

- 3) Analyze existing monitoring data to assess both the short and long term trends in timber rattlesnake populations.

Status of task(s): This task has been mostly completed, but is ongoing. The PFBC monitoring program that started in 2003 has shown only a 4% recapture rate at the monitoring sites. This low recapture rate is indicative of a very high population density. This monitoring plan is in the process of being enhanced and expanded with the new East Stroudsburg University monitoring project.

- 4) Continue and expand ongoing protection measures for timber rattlesnake populations.
 - a. Review and comment on permit applications that involve proposed temporary and/or permanent disturbances to known habitat areas.
 - i. Mitigate for both direct and indirect impacts to the timber rattlesnake habitat.
 - ii. Spot check projects to confirm adherence to recommended mitigation actions.
 - b. Develop best management practices.
 - c. Continue to manage/enforce the PFBC Venomous Snake and Organized Hunt Permits.

Status of task(s): These tasks have been mostly completed, or are ongoing.

4a. PFBC staff continues to review and comment on development projects across the state when there are conflicts with Timber Rattlesnake critical habitats. For example, in 2015, 383 projects with Timber Rattlesnakes potential conflicts were reviewed by PFBC biologists and resolved. With this consultation process, when there are direct impacts expected to gestation habitat, these habitats are either avoided by the project proponent or gestation habitat creation is recommended (Timber Rattlesnake gestation habitat creation document:

<http://fishandboat.com/water/amprep/snake/rattlesnake/timber-conserve/HabitatCreationTimberRattlesnakes.pdf>).

Having “snake monitors” on site to keep snakes out of harm’s way and to protect workers on site is another form of commonly recommended mitigation action. Sites with mitigation actions (e.g., habitat creation) are visited and inspected by staff.

4b. Best management actions were developed for Timber Rattlesnakes in the new Pennsylvania Conservation Explorer (PACE). See the link for more information:

<http://fishandboat.com/water/amprep/snake/rattlesnake/timber-conserve/TimberRattlesnakeBestMgmtPracticesEarthMovingProjects.pdf>

4c. PFBC continues to permit and monitor approximately five (5) Organized Snake Hunts annually.

5) Maintain and expand cooperative working relationships with Federal and Pennsylvania State agencies regarding conservation practices of timber rattlesnake populations on public lands.

- a. Work with state and federal partners to require the adoption of a no-kill policy for contractors, sub-contractors, and their respective field employees while working on publicly owned lands.
- b. Assist with the development and implementation of habitat maintenance and /or habitat improvement programs for specific management units, targeting existing gestation sites.
- c. Work with supervising foresters on public lands to notify PFBC immediately if field crews encounter high concentrations of rattlesnakes (>4 rattlesnakes in 2 m² area).
- d. Cooperate with design and review of timber rattlesnake research on public lands.

Status of task(s): These tasks have been completed or are ongoing.

a. The PFBC has worked with the Department of Conservation and Natural Resources (DCNR) and the Pennsylvania Game Commission (PGC) regarding no-kill policies for their contractors. These policies are in place.

b. The PFBC has been working with DCNR, PGC, and Allegheny National Forest (U.S. Forest Service) staff to conduct habitat management at key gestation sites. Since 2013, 42 gestation sites have been specifically managed for Timber Rattlesnakes on state and federal lands, and several gestation sites are planned or are in the process of being managed in 2016.

c. The PFBC has had Timber Rattlesnake Management workshops and discussions with PGC and DCNR land managers and they have notified us of high concentration sites.

d. The PFBC has been involved with or assisting in the field, advising, and permitting at some level Timber Rattlesnake projects in state forests conducted by Penn State researchers (Rocco et al. (2013), Stoleson et al. (2014)).

6) Provide outreach to the public to provide information and promote tolerance of the timber rattlesnake.

Status of task: This task has been completed or is ongoing. PFBC staff gives numerous outreach presentations on an annual basis regarding Timber Rattlesnake conservation and tolerance. Also, PFBC has developed several Angler & Boater articles, brochures, and pamphlets dedicated to the Timber Rattlesnake outreach and education. See the PFBC website Amphibian and Reptile Page and articles under “Rattlesnakes”: http://fishandboat.com/amp_rep.htm

7) Review the regulations and policies concerning the timber rattlesnake and provide recommendations as deemed necessary.

Status of task: In 2013, the PFBC developed a Timber Rattlesnake Conservation Workgroup. The workgroup is made up of rattlesnake experts, including rattlesnake consultants, state and federal biologists, researchers, educators, academics, and land managers (PGC, DCNR, and US Forest Service). This workgroup met several times since 2013, and has reviewed the PFBC Timber Rattlesnake regulations. It did not recommend any changes. PFBC staff periodically review their regulations and will update as needed.

The Timber Rattlesnake SAP was written in June of 2011; because it is a 5-year plan, it expires in 2016. It will be updated in 2016 for the next 5-year period to reflect new information which has been obtained about the species since it was developed.

Response regarding the Timber Rattlesnake Monitoring Plan: The PFBC does in fact have a Timber Rattlesnake monitoring program in place. The PFBC initiated a monitoring program back in 2003 as part of the State Wildlife Grant funded Timber Rattlesnake Site Assessment and Inventory project, when 8 monitoring sites were set up across the state. These sites cover several physiographic regions. Monitoring included annual site visits at these sites in which mark-recapture techniques were utilized. To date, approximately 1,500 Timber Rattlesnakes have been Passive Integrated Transponder (PIT) tagged at these monitoring sites, with only a 4% recapture rate. Our Timber Rattlesnake Site Assessment and Inventory Project (TRAP) members continue to monitor these sites. This monitoring plan will be enhanced with the new East Stroudsburg University monitoring study.

4. Comment: Commenters (H. Reinert, S. Boder, B. Fiegel) expressed concerns about the Species Action Plan (SAP) that include: 1) lack of defined management units, 2) a need to develop a habitat management plan, and 3) a need to identify, protect, and manage assurance populations. Other

concerns include the need for coordination with various partners (DCNR, PGC, USFS-Allegheny National Forest, NGOs, etc.) to implement the SAP and a need to reconvene and maintain an active external workgroup. Commenters indicated that these concerns need to be addressed prior to a delisting decision.

a. **Related comments:**

- i. **More areas should be off-limits to hunting.** (R. Zumstein)
- ii. **No evidence that effective management can be implemented.** (M. Torocco)

Response: While these comments are about current conservation and management issues relating to the Timber Rattlesnake, they do not pertain directly to the status classification change. However, brief updates addressing the concerns are provided below.

Lack of defined management units: This concern does not pertain to the listing analysis, but the PFBC is considering the development of management units as recommended in Bushar et al. (2011) for future population monitoring sites and managing permits in the venomous snake program. A South Mountain Management Unit exists by virtue of a prohibition of take under § 79.3 (see Comment #2).

A need to develop a habitat management plan: This concern does not pertain to the listing analysis, but the PFBC is actively conducting habitat management at priority gestation sites on state and federal lands across the state.

A need to identify, protect, and manage assurance populations: Assurance populations are stable populations that have full protection from collection and development encroachment and occur on protected land. The PFBC is considering the concept of assurance populations on public lands (e.g., Natural Areas). This concept has been discussed in the Timber Rattlesnake Conservation Workgroup and needs to be further explored in upcoming workgroup meetings.

Concerns include the need for coordination with various partners to implement the Species Action Plan: The PFBC actively works with state, federal, and non-government organizations regarding Timber Rattlesnake conservation and management. The external workgroup developed by the PFBC, the Timber Rattlesnake Conservation Workgroup, is an example of the PFBC working with various partners. The PFBC is also working with various state and federal partners regarding active management and conservation of Timber Rattlesnakes on their respective lands (examples: gestation habitat management, consultation on land development projects). Another example of this is that the PFBC worked closely with PGC to develop best management practices for activities occurring on State Game Lands that could impact Timber Rattlesnakes (PGC Game Lands Management Tool).

Concerns about the need to reconvene and maintain an active external workgroup: The PFBC Timber Rattlesnake Conservation Workgroup has been meeting since 2013 and plans to continue to meet and work on Timber Rattlesnake conservation and management issues for the foreseeable future.

Commenters indicate that these concerns need to be addressed prior to a delisting decision. These concerns have all been addressed or are in some level of development, but they are ancillary to the criteria analysis of the Candidate designation change proposal.

More areas should be off-limits to hunting: The PFBC acknowledges this concern and is open to considering other areas to be designated off-limits to hunting/collection (e.g., South Mountain population). The PFBC needs proof of decline to make this management and regulatory change. In South Mountain, the PFBC compared historic data to contemporary data and found that 70% of the sites were extirpated, historic, or were in very poor condition. If this or similar data comparative data can be shown, other areas can be considered for hunting prohibitions.

5. Comment: Commenters (C. Singh, H. Reinert) expressed concerns that the Timber Rattlesnake workgroup had not been assigned tasks to work on these plans nor was it consulted regarding the species status change. Commenters requested a description of the purpose of this working group and any relevant updates.

a. **Related comments:**

- i. **Commenter (R. Stechert) recommended development of a Timber Rattlesnake advisory committee.**
- ii. **Commenter (S. Boder) was concerned that Timber Rattlesnake consultants were not invited to participate in the workgroup.**

Response: The Timber Rattlesnake Conservation Workgroup purpose was not tasked with evaluating the status of the Timber Rattlesnake. The workgroup's charge is much broader. The charge of the workgroup is "to further develop conservation measures and practices for the long-term viability of the Timber Rattlesnake in Pennsylvania". This charge was given at the beginning of the first meeting and repeated at each meeting thereafter. There are several Timber Rattlesnake consultants residing on this committee. The actual status change deliberations occurred in the PABS Reptile and Amphibian Technical Committee, which serves as an official advisor on herpetological issues to the PFBC's staff. The Technical Committee communicated its status change recommendation to PFBC staff. There are rattlesnake consultants on the PABS committee also.

The workgroup was tasked with reviewing and providing recommendations for PFBC management actions for Timber Rattlesnakes. For example, the Timber Rattlesnake Conservation Workgroup was presented with all PFBC Timber Rattlesnake regulations. The regulations were reviewed and discussed at length at the meetings. Some recommendations were considered and in one case advanced. Also, the workgroup was given multiple drafts of the Timber Rattlesnake Best Management Practices document to review and comment on, which contributed to the final draft of the document.

The PFBC Timber Rattlesnake Conservation Workgroup will meet after the field season in summer/fall 2016 to continue to work on the assurance populations on public lands, review the new environmental review tool (Pennsylvania Conservation Explorer or PACE), discuss permitting results of 2015, the management unit concept, Timber Rattlesnake education and outreach, and various other conservation and management issues.

6. Comment: Commenters (C. Uhrin, E. Cashion, S. Boder, C. Carey) expressed concerns about how the PFBC interpreted 50% of the unassessed TR locations/habitat. Commenters suggest that if the PFBC is in fact suggesting that more locations/habitat is present, more evidence should be provided, particularly regarding to the status of populations within the 50% that has already been assessed.

Response: The percentage of the unassessed range of the Timber Rattlesnake is *estimated* to be 20-50%. Even with a relatively high estimated percentage of the total land mass and potential habitat of the Timber Rattlesnake being unassessed, the Timber Rattlesnake still does not meet Candidate criteria. With over 70% of sites occupied and reproduction confirmed at a vast majority (65%) of these sites, the species clearly does not meet Candidate criteria and appears to be stable. 907 new sites have been found in Pennsylvania since 2003 (average=50/year). In 2015, 89 new sites were found. As of June 2016, 48 new critical habitats had been found and assessed. As the PFBC assessment team searches more unassessed habitats, it is finding more Timber Rattlesnake critical habitats (with evidence of reproduction). This is not a sign of a population in decline, but one of growth and stability.

7. Comment: Commenter (S. Boder) was concerned about how the quality of sites was evaluated during the PFBC's Timber Rattlesnake Assessment Program (TRAP). Commenter wrote:

the TRAP data used to calculate the percentage of high to medium quality sites in the Commonwealth is probably significantly skewed. The PFBC instructed TRAP volunteers to rank or grade the quality of sites differently depending on the estimated size of the population of the region that the volunteer was working in. In portions of the Commonwealth where regional populations were regarded by the PFBC to be of lower quality (e.g. South Mountain, parts of Northeast, Northwest etc.), the PFBC advised the volunteers to grade the best sites (typically just medium quality or the best low quality sites) found within low quality regions as high or higher quality sites even if the sites had much lower numbers of snakes and were of much lower quality than the high quality sites of high quality regions.

Essentially, TRAP surveyors were grading medium or low quality sites higher in low quality populations/regions than they would grade sites in high quality regions, such as Northcentral PA. The percentage of high to medium quality sites in the Commonwealth (presented as 35.8% by PFBC) would in actuality be significantly lower if specific sites were ranked/graded with an unbiased system throughout the Commonwealth.

How did PFBC address this quality-of-sites issue in the proposed delisting?

Response: Quality of sites is not a listing criterion in the IUCN criteria that needs to be met, so this comment is not directly tied to the status change proposal. However, ranks were used to quantify the threats at the assessed sites. The PFBC took these measurements to assess the quality of each site using standard NatureServe techniques, and while there are regional biases and subjectivity by assessors, the quality assessment method was standardized across all regions of the Commonwealth in TRAP team member training. Important in the listing analysis is Timber Rattlesnake presence at the sites, the broad distribution of the sites across the Commonwealth (51 of 67 counties), multiple snakes were found at these sites, and 65% of the assessed sites have evidence of reproduction.

8. Comment: Commenter (S. Boder) was concerned that the TRAP was not designed for a rigid analysis of the Timber Rattlesnake population.

Response: See answer to Comment 1, specifically B.2.b.5. *Number of mature individuals*. Range and occupancy data are often used as surrogates for population data when population sizes cannot be explicitly measured at the required scale. There are many other published studies that use various metrics (e.g., CPUE) to monitor populations when actual population data is not available (Lieb et al. 2008). This holds true also in management of fish populations by the PFBC. As a result, the PFBC is justified in using the data we have collected and will collect in the future to assess the status of the Timber Rattlesnake population now and in the future.

9. Comment: Commenters (C. Uhrin, J. McDermott, E. Cashion, S. Boder) expressed an interest in the PFBC providing data demonstrating increased basking activity at pipelines. Commenters were concerned about the PFBC's use of anecdotal observations to make broader claim of increased basking activity which could be highly speculative.

a. **Related comments:**

- i. **“The PFBC notes that anecdotal evidence thus far shows that while there are increasing threats to Timber Rattlesnakes through exposure to human disturbance, some of the habitat alteration (for example, pipeline development) can provide important additional basking habitat in areas where canopy closure has posed problems for available basking and**

gestating habitat. While this is in some cases true, it has been observed by myself and numerous other Timber Rattlesnake biologists that pipeline development can also destroy over-wintering dens and sometimes remove critical basking and gestation habitat.” (S. Boder)

- ii. **“It should also be noted that when new pipelines and other utility rights-of-way open up basking habitat in areas where canopy closure has been a problem, rattlesnakes will often become immediately drawn to the new open area and if construction takes place during the active rattlesnake season, an abundance of human-rattlesnake encounters (and likely wanton killing of rattlesnakes) will ensue without the presence of a monitor”.** (S. Boder)

Response: Numerous PFBC staff have directly observed and documented Timber Rattlesnakes basking in habitat on newly created pipelines and utility Right-of-Ways. Besides one isolated incident that PFBC staff are aware of, in which a pipeline company was fined for disturbing an overwintering area, the destruction of denning habitat by pipelines has not been documented or reported to the PFBC. Our environmental review consultations aim to avoid this situation (e.g., destruction of dens). Observed destruction of known den (overwintering) habitat needs to be reported to the PFBC Natural Diversity Section or the Bureau of Law Enforcement immediately.

10. Comment: Commenter (P. Dunning) expressed concerns about number of gestating vs. den sites that are known.

Response: The PFBC acknowledges that den sites are difficult to determine (directly observing snakes going into their overwintering dens or emerging from them) due to the restricted window of emergence (egress) and retreat (ingress) the species has in which denning can be confirmed, or using radio telemetry, which is time and labor intensive to confirm denning habitat. However, the TRAP assessment team members and PFBC biologists involved with the assessment have 10 or more years of experience identifying Timber Rattlesnake denning and gestation habitat in Pennsylvania. To date, 1,889 sites have been assessed. Approximately half of the sites that have been found to be occupied with Timber Rattlesnakes and identified as critical habitat have been classified as denning habitat. Gestation sites are known generally to occur near den sites, as such, these gestation areas are good surrogates of denning areas, which are both protected in the environmental review process. As we have for the past 12 years, the PFBC is committed to continuing to search for and locate Timber Rattlesnake critical habitat (denning and gestation sites).

11. Comment: Commenter (S. Boder) suggested there could have been bias or potential conflict of interest in the PABS Amphibian and Reptile Technical Committee (ARTC) vote to delist the Timber Rattlesnake. The commenter requested a description of the ARTC committee’s purpose and role as it relates to PFBC’s delisting decision, the members of the committee, and whether or not there were abstentions related to real or perceived potential conflicts of interest.

Response: The PABS Amphibian and Reptile Technical Committee (ARTC) acts in an advisory capacity to the PFBC’s staff regarding herpetofauna biodiversity issues. It is a non-profit group made up of volunteer scientists that represent different state and federal agencies, non-government organizations, academic institutions, and consultants. There are similar PABS technical committees for fish, freshwater mussels, and aquatic invertebrates. The PABS technical committees are not the decision maker in this process, but an *advisor* to PFBC staff on scientific issues.

The ARTC’s role in listings has been active in recent years on numerous threatened and endangered species listings. The committee is often apprised of the original petition for a status change, but more often, one or more of the committee members are involved with developing the “documentation form” of

the proposed status change and then presenting it to the ARTC for feedback and consideration (the documentation form is a comparative analysis of the historic versus contemporary data used in the listing/delisting determination, threats analysis, etc.). Once the species have been run through the IUCN criteria and the documentation form is finalized, the ARTC votes on the status change. The PFBC's staff typically takes the ARTC's majority vote into consideration when deciding whether to recommend a species' listing or delisting to the PFBC's Board of Commissioners. The ultimate decision maker in all listing and delisting decisions is the PFBC's Board.

In this case, since the PFBC was the lead of the status assessment, PFBC staff initiated the IUCN criteria analysis and documentation development and presented it to the ARTC for consideration (twice). The initial vote had abstentions, as some committee members were confused about the process or did not feel that they fully understood the status change proposal. However, the majority of the committee voted in favor of the status change. At the next meeting, the status change proposal was presented again and discussed at length. Again, a majority of the ARTC voted in favor of the status change, and the recommendation was formalized and forwarded to PFBC staff for consideration.

The PFBC's staff disagree with the comment that there was potential bias or conflict of interest in the committee. Bias in the committee is speculative and unlikely, as the committee is comprised of a well-balanced variety of professionals in the herpetological community. The majority of the committee voted in favor of the status change due to the criteria analysis and rationale that the Timber Rattlesnake does not meet Candidate status criteria.

12. Comment: Commenters (C. Howey, M. McCort, S. Crescenzo, G. MacGregor, J. Collins, J. Taylor, F. Tarnaski, H. Reinert, S. Boder, W. Brown, others in part) **requested that a status change only be considered after completion and publication of results of the recently-funded East Stroudsburg University population study. Commenter** (S. Boder) **suggested that the study was not of long enough duration to consider the species longevity and life history. Can PFBC explain why it is not necessary to postpone a delisting decision until after this study is complete?**

Response: It is not necessary to postpone a classification change (delisting) because the status assessment has been completed (PFBC 12-year study). Please see response to Comment #1 (criteria analysis). The East Stroudsburg University study is the further refinement and development of a monitoring program, NOT an approach to conduct a new status assessment of the species.

13. Comment: Commenters (B. Bielema, C. Buckley, D. Hughes, G. MacGregor, J. Collins, E. Nordberg, M. Torocco, M. Mazur, T. Warner, H. Reinert, S. Boder) **expressed concerns about implications of a decrease in Timber Rattlesnake conservation in Pennsylvania given the species status in other states throughout its range, or expressed that Pennsylvania is a “responsibility state” for Timber Rattlesnakes.**

Response: PFBC acknowledges the concern of decreased protection or conservation with the status designation change, but the PFBC is not changing its management practices or policies. The Timber Rattlesnake is still considered a Species of Greatest Conservation Need (SGCN) in the Pennsylvania Wildlife Action Plan (PGC and PFBC 2015). The hunting regulations are still in place, the environmental review process is the same, and the Timber Rattlesnake Species Action Plan is still being implemented and will be updated in 2016, which includes keeping the Timber Rattlesnake Conservation Workgroup active and engaged in Timber Rattlesnake conservation and management issues. The PFBC recognizes that Pennsylvania holds an important population of the species in the northeast. The PFBC is committed to keeping the Timber Rattlesnake a stable and healthy population.

14. Comment: Commenters (B. Benner, B. Fiegel, C. Buckley, C. Peeling, C. Turben, D. Hughes, D. Schneider, S. Foster, S. Enders, E. Nordberg, P. Smith-Blackwell) **expressed concerns about a correlation between delisting and decrease in public awareness of the need for Timber Rattlesnake conservation.**

a. **Related comment:**

i. **Commenter** (W. Brown) **indicated that the species “will suffer from decreased conservation attention and scientific work that otherwise may establish its degree of vulnerability or potential robustness.”**

Response: The PFBC acknowledges the concern about a decline in conservation actions in the event of a classification change. However, collection regulations are not changing, environmental review will continue unaltered to protect Timber Rattlesnake critical habitat, and the Species Action Plan is still in place and will continue to be implemented. There is virtually no lessening of regulations or protection planned in the species management after this classification change. The PFBC will continue its education and outreach efforts.

15. Comment: Commenter suggested that Timber Rattlesnake decline was underestimated in 1990, when Commenter (W. Martin) **and others believed extant populations were around 30% of historical levels. Commenter now believes that most populations at that time ranged from 5-15% of historical levels.**

Response: See criteria analysis (response to Comment # 1). The PFBC’s 25-year comparative analysis, which was summarized in the preamble of the notice of proposed rulemaking shows a species with an increasing and stable population within the Commonwealth, which is contrary to the claim in the comment. No supporting documentation was provided with this comment, and therefore, it is viewed as speculative. The PFBC welcomes supporting documentation to substantiate the claim for review and consideration.

16. Comment: Commenters (P. Dunning, S. Boder, R. Stechert) **indicated that the privately-owned portions of the Timber Rattlesnake’s range have not been adequately surveyed (due to lack of access permission) and these populations may not be faring as well as Timber Rattlesnake populations on public lands.**

Response: The PFBC agrees that Timber Rattlesnake habitat on private lands has not been adequately surveyed, and the agency will continue to work with private landowners to access their land and assess Timber Rattlesnake potential habitat. The assertion as to the quality of Timber Rattlesnake habitat occurring on private lands without surveys would be entirely speculative. However, even without knowing the status of habitat on private land, the vast majority of PFBC Timber Rattlesnake location data occurs on public land (75%), which is managed by state and federal partners. The PFBC will continue to work with these state and federal partners to manage their lands for the benefit and conservation of the Timber Rattlesnake.

17. Comment: Commenters (P. Dunning, C. Turben, R. Zumstein) **expressed concerns about Timber Rattlesnake’s status or assessment level outside of Pennsylvania’s North Central region.**

Response: While the PFBC is concerned about the peripheral populations that occur within the Commonwealth (away from the stable northcentral region), the criteria analysis (see Criteria Analysis, question 1) considers the entire statewide population. The PFBC is committed to continuing to work with its conservation partners to manage and protect these peripheral populations.

18. Comment: Commenters (P. Dunning, S. Boder) **cited research by biologists and volunteers that noted populations are significantly depleted and still declining in NE, SE, SW, and NW PA.**

- a. **Related comments:**
 - i. **Posited that a rapid decrease in Timber Rattlesnakes populations may occur if candidate protection is removed (C. Carey)**
 - ii. **Reported personal observation of Timber Rattlesnake decline in the absence of human activity and in areas of hunting pressure (D. Badger)**

Response: See previous response (Comment #17). Declining populations need to be documented. If supporting or actual data can show decline, collection prohibitions can be placed on these populations (e.g., like the South Mountain population) to allow these populations to rebound. The PFBC will continue to work with its conservation partners to address documented declining populations through management and protection.

19. Comment: Commenters (C. Turben, J. McDermott, R. Everett) had concerns about political/energy industry motivations influencing what should be a scientific process.

Response: There has been no pressure on the PFBC by politics or the energy industry to remove the Timber Rattlesnake from the Candidate list. This is a matter of timing - a completed 12-year status assessment, and evaluation of the data through the listing criteria. The PFBC aims to maintain the Timber Rattlesnake population or enable it to increase through existing hunting regulations, and continued conservation and management action consistent with the Timber Rattlesnake SAP.

20. Comment: Commenter (E. Cashion) expressed concerns about the lack of population assessment data presented in the proposal to delist.

Response: See the response to Comment #8.

21. Comment: Commenter (C. Howey) expressed concerns about lack of knowledge regarding actual population sizes throughout the state.

Response: See response to Comment #8 and criteria analysis in Comment #1. Population data is difficult to obtain. Listing decisions are typically made with distribution presence-absence data and supporting relative abundance data.

22. Comment: Commenters (W. Kayser, Lindsey K.) expressed concerns that information about population genetic structure is needed in order to better understand vulnerability and viability of different snake populations.

Response: This information is not needed to make a listing decision. The conservation genetics of the Timber Rattlesnake population was considered in Bushar et al. (2011) and suggests there are three unique genetic distinct areas within the Commonwealth. While it is true that the genetic structure of Pennsylvania's Timber Rattlesnake populations is not completely known and that gene flow is an important consideration in conservation management, the PFBC is mandated to manage species at the population level at the scale of the entire state and at this time the data do not justify listing the Timber Rattlesnake in Pennsylvania. The PFBC will continue to collect and analyze data, and if declines are observed, the PFBC will act accordingly.

23. Comment: Commenter (W. Kayser) expressed concern that population and locality numbers alone do not properly identify the complex genetic mechanisms at play. A full understanding of population genetic structure would better serve to more accurately reflect the true health and/or vulnerability in Timber Rattlesnake populations.

Response: See response to previous question (Comment #22).

24. Comment: Commenter (M. Torocco) indicated that PFBC has not demonstrated the stability of the Timber Rattlesnake in the state.

Response: The PFBC's staff disagree with the comment. The PFBC's 12-year status assessment (PFBC 2012) and additional data demonstrate that the species occupies much of its former range in 51 of 67 counties, is potentially expanding, and is stable and reproducing across its range in Pennsylvania. See Criteria Analysis in response to Comment #1.

25. Comment: Commenter (K. Stairs) supports delisting provided the snake's status is carefully monitored.

Response: The East Stroudsburg University study will be developing a more robust population monitoring program for the PFBC. The PFBC is committed to monitoring and managing the population into the future.

THREATS

26. Comment: Commenters (A. Wolf, C. Camacho, C. Smith, C. Carey, P. Dunning, S. Crescenzo, S. Foster, J. Collins, T. Root, R. Shearer, S. Boder) wanted to know if the PFBC adequately considered the species life history vulnerabilities (age to sexual maturity /low fecundity/recruitment rate) as they related to current/emerging threats to Timber Rattlesnakes prior to the delisting proposal.

Response: The PFBC did consider the life history vulnerabilities and threats in the status change documentation. However, while they are part of the qualitative assessment within the documentation process, they are not necessarily needed to list or delist. See response to Comment #8. The PFBC followed a well-defined, scientific methodology that has proven effective in conservation programs throughout the world. These concerns are addressed in the threats analysis.

27. Comment: Related to species life history, Commenter (W. Brown) described his Timber Rattlesnake research and concerns regarding the snake's vulnerability and stated:

My work on the survival and reproductive dynamics of this species indicates that the snake clearly cannot withstand unregulated harvesting -- or perhaps any harvesting -- in most areas of its North American range. My most recent work (now in a stage of formal completion) shows that female Timber Rattlesnakes in their northern range have severe life history constraints that do not enable the animal to recover from exploitation. Specifically, females do not reach reproductive maturity until an average age of 9 to 10 years, reproduce only at intervals of 3 to 5 years, and have relatively small average litter sizes (around 8 young per brood). Most alarming, I have documented that almost two-thirds of the females reproduce only once because they face severe energy restrictions and depletion following their birthing year, thus subjecting them to increased starvation and predation.

Response: The PFBC acknowledges the concern about reproductive limitations of adult female Timber Rattlesnakes. The PFBC considered this and many other life history vulnerabilities (collection or harvest of adult females) in the documentation process. Existing PFBC regulations protect adult females (and young) from being collected. Also, the PFBC comments on earth moving projects that may affect gestation areas. These regulations and consultations will not change after the designation change and will remain in place for the foreseeable future.

28. Comment: Numerous commenters (see below) had concerns about threats to the Timber Rattlesnake. Commenter (B. Fiegel) indicated that the PFBC has not considered or addressed the long-term effects of threats on the Timber Rattlesnake prior to making a delisting determination.

Threats for which concerns were expressed include:

- a. **Concerns about snake fungal disease** (A. Wolf, B. Brown, B. Swayser, B. Fiegel, D. Badger, J. Collins, R. Autry, W. Kayser, E. Nordberg, M. Wilson, R. Shearer, S. Boder)
 - i. **Concerns about the status of snake fungal disease (*O. ophiodiicola*) within existing populations and how these site level concerns translate to the state level** (C. Uhrin)
- b. **Concerns about effects of poaching** (B. Swayser, R. Everett, S. Boder)
- c. **Concerns about wanton killing** (B. Benner, C. Buckley, M. Skvarla, P. Dunning, M. Mazur, M. Wilson, R. Everett, H. Reinert)
 - i. **Posits that the risk of wanton killing and recreational collecting “will increase significantly, perhaps even dramatically as a result of delisting.”** (S. Boder)
- d. **Concerns about highway mortality** (B. Swayser, D. Schneider, R. Shearer, R. Ferguson)
- e. **Concerns about organized snake hunts (rattlesnake round-ups)** (S. Enders, M. Mazur, H. Reinert)
- f. **Concerns about hunting pressure as a result of delisting** (B. Brown, I. Kanda)
 - i. **Posits that the risk of wanton killing and recreational collecting “will increase significantly, perhaps even dramatically as a result of delisting.”** (S. Boder)
- g. **Concerns about pet trade** (B. Benner, H. Reinert)
- h. **Concerns about habitat destruction** (R. Ferguson, R. Everett)
- i. **Concerns about development impact/fragmentation on snake’s overwintering site fidelity/gene flow/mortality** (C. Camacho, S. Foster, J. Collins, R. Zumstein, W. Kayser, R. Shearer)
- j. **Concerns about unforeseen and potentially catastrophic future events could further compromise the genetic viability of current Timber Rattlesnake population structures** (W. Kayser)
- k. **Concerns about effects of construction (pipelines, natural gas development, etc.) on dens and gestation areas.** (A. Wolf, B. Benner, B. Fiegel, C. Camacho, C. Peeling, D. Hughes, D. Badger, D. Schneider, R. Everett)
- l. **Concerns about energy development (wind farms/unconventional shale gas)** (Mehoopany Creek Watershed Association)
- m. **Concerns about recreational use pressures (permitted snake hunting, snake hunts ATVs)** (D. Badger, P. Dunning, H. Reinert, S. Boder)

Response: The PFBC considered these threats in the documentation process. There will be no change in the regulations and enforcement concerning the pet trade, snake hunts and general hunting, poaching, wanton killing, and recreational collecting. These activities will continue to be strictly regulated and enforced as they have been in the past. The PFBC also does not expect major changes in highway mortality, habitat destruction, construction activities, and energy development in the foreseeable future. Although the PFBC acknowledges that these activities may result in some level of mortality, the PFBC does not expect them to significantly impact Timber Rattlesnakes at the statewide population level in Pennsylvania. The PFBC will continue to monitor the situation and if populations begin to decline as a result of these factors, the PFBC will take appropriate action.

29. Comment: Commenter (P. Dunning) asked if the PFBC adequately considered aggregate site-level concerns regarding intolerance to adult mortality, particularly if gravid females are removed from the population.

Response: See response to Comment #27.

ENVIRONMENTAL REVIEW PROCESS

30. Comment: Commenter (S. Crescenzo) indicated that if delisting occurs, environmental review will be conducted differently and developers will not be held to current standards which allow for avoidance and minimization of impacts to snakes and their critical habitats.

Response: See response to Comment #2 for a brief description of the environmental review process as it pertains to Timber Rattlesnakes. The environmental review process is expected to be the same before and after the status designation, as the Timber Rattlesnake will still be considered a Species of Concern or Species of Greatest Conservation Need. The PFBC strives to resolve permitting conflicts using principles of avoidance, minimization, and mitigation and uses a balanced approach. Projects that fall within a mile of a known critical habitat (den or gestation site) are given recommendations of conducting habitat assessments, den/gestation presence surveys, snake monitors on-site to protect rattlesnakes, or consultation (see link for Timber Rattlesnake BMP's: <http://fishandboat.com/water/amprep/snake/rattlesnake/timber- conserve/TimberRattlesnakeBestMgmtPracticesEarthMovingProjects.pdf>). If the project will have a direct impact on known critical habitats, consultation with PFBC biologists is required.

31. Comment: Commenters (B. Benner, B. Fiegel, C. Camacho, C. Biondich, P. Dunning, S. Crescenzo, J. Collins, R. Zumstein, R. Bertoni, R. Everett, R. Stechert, S. Boder) expressed concerns about weakening environmental review policies and implications for the Timber Rattlesnake.

Response: See response to preceding comment.

32. Comment: Commenters (J. Collins and others) suggested a species decline if environmental review protections are removed.

Response: See response to Comment #30.

33. Comment: Commenter (C. Biondich) expressed concerns about removal of ridge-top protection that Timber Rattlesnake environmental reviews provide and implications for other protected vertebrate, invertebrate, and plant species.

Response: See response to Comment #30.

34. Comment: Commenter (S. Boder) indicated that numerous Timber Rattlesnake den sites have been saved from direct destruction by the environmental review process.

Response: The PFBC agrees with the comment.

35. Comment: Commenters (R. Stechert and others) wanted acknowledgement of benefits of the environmental review process to Timber Rattlesnakes.

Response: See Comment #34.

36. Comment: Commenter (W. Munroe) expressed concerns that basking and denning locations are available for the public’s review on the PNDI tool.

Response: Critical habitat is not revealed with the PNDI tool.

37. Comment: Commenter (S. Boder) indicated that most of the 1,269 known sites in the Commonwealth that were assessed by TRAP are only gestation sites. In most cases the over-wintering dens have not been identified. An environmental review program that focuses specifically on the protection of known sites will be protecting primarily just the known gestation sites; most of the over-wintering den sites that are associated with the known gestation sites will not be protected.

Response: See response to Comment #10

38. Comment: Commenter (Mehoopany Creek Watershed Association) does not like past PFBC recommendations for mitigation by creating new dens.

Response: This comment is not relevant to the proposed delisting. There appears to be confusion about denning (overwintering) habitat versus gestation site creation. Given specific microclimate and other characteristics that Timber Rattlesnakes need for overwintering sites that we still do not fully understand, the PFBC does not recommend creating new denning (overwintering) habitat in our earth moving project consultations. Denning habitats are considered irreplaceable. However, when gestation habitat cannot be minimized or avoided, the PFBC does recommend creating gestation habitat. See the PFBC’s (gestation) habitat creation guidelines document: <http://fishandboat.com/water/amprep/snake/rattlesnake/timber-protect/HabitatCreationTimberRattlesnakes.pdf>

MANAGEMENT OF TIMBER RATTLESNAKES

The following comments do not address the merits of the PFBC’s proposed delisting of the Timber Rattlesnake.

39. Comment: Commenter (S. Boder) noted that “PFBC mandated Timber Rattlesnake hunting restrictions and regulations have indeed helped to bring Timber Rattlesnake populations back to healthy levels (primarily on several public lands) in portions of Northcentral, Central, Southcentral and Southwestern Pennsylvania.”

a. **Related comment:**

i. **Posits that existing status has helped it rebound from hunting pressure. (B. Brown)**

Response: The PFBC agrees with this comment.

40. Comment: Commenter (W. Kayser) asserted that the PFBC and its many dedicated associates have clearly made great progress in tabulating baseline data that can serve as a foundation for the continued conservation and maintenance of viable Timber Rattlesnake populations.

Response: The PFBC appreciates the acknowledgement of progress in collecting baseline data for current and future management purposes.

41. Comment: Commenters (P. Dunning, R. Zumstein, S. Boder) had concerns about management for shading of overwintering sites, gestating sites.

Response: See response to Comment #38. The PFBC is working with its state and federal partners to actively prioritize and manage gestation habitat on public lands.

42. Comment: Commenter (B. Benner) had concerns about protecting Timber Rattlesnake den locations that are on the northwest slopes of mountains per observations as a snake monitor.

Response: Relatively few known dens and/or gestation sites occur on north facing slopes, as they typically occur on the warmer, southern exposures. The PFBC continues to survey unassessed portions of the Timber Rattlesnake range, including north facing slopes. When located, these sites will be managed and protected as any other critical habitat would be.

43. Comment: Commenter (R. Zumstein) recommended that prospective snake hunters undergo a snake certification course, similar to PGC cable restraint trapping course as a way educate and inform individuals prior to applying for a snake permit.

Response: The PFBC acknowledges this recommendation.

44. Comment: Commenter (D. Badger) wanted PFBC to ban hunting of male Timber Rattlesnakes and copperheads.

Response: The PFBC acknowledges this recommendation.

45. Comment: Commenter (W. Kayser) reported that it is unknown if the organized removal, and/or interference with, even small numbers of male rattlesnakes could lead to an additional severe loss of future genetic diversity.

Response: See responses to Comment #17 and #18. While it is true that the genetic structure of Pennsylvania's Timber Rattlesnake populations is not completely known and that gene flow is an important consideration in conservation management, PFBC is mandated to manage species at the population level at the scale of the entire state and at this time the data do not justify listing the Timber Rattlesnake in Pennsylvania. PFBC will continue to collect and analyze data and if declines are observed PFBC will act accordingly.

46. Comment: Commenter (R. Bertoni) recommended that Blue Mountain between the Delaware and Schuylkill Rivers be designated "no-take" for Timber Rattlesnakes.

Response: The PFBC acknowledges the concern. See response to Comment #17 and #18.

SPECIFIC CONCERNS REGARDING TIMBER RATTLESNAKES

The following comments do not address the merits of the PFBC's proposed delisting of the Timber Rattlesnake.

47. Comment: Commenters (C. Turben, R. Zumstein) expressed concerns about vulnerability of Northwest Pennsylvania Timber Rattlesnake population and magnification of any threats to these populations given their scarcity in this part of the state.

Response: The PFBC and TRAP project participants will be focused on assessing the northwest region sites and conducting habitat management on priority sites.

48. Comment: Commenter (R. Zumstein) expressed concerns about loss of gestating habitat in the Northwest.

Response: See previous response.

MISCELLANEOUS COMMENTS

The following comments do not address the merits of the PFBC's proposed delisting of the Timber Rattlesnake.

49. Comment: Commenter (G. MacGregor) cited the value of Timber Rattlesnakes to PA wild areas.

Response: The PFBC acknowledges this value.

50. Comment: Commenter (R. Shearer) cited "severe threats" to Timber Rattlesnake populations in Venango, Clarion, Forest, and Fayette Counties.

Response: See response to Comments #17, 18, and 47.

51. Comment: Commenter (C. Carey) expressed concern about ecosystem impacts associated with a decline in Timber Rattlesnakes.

Response: The PFBC acknowledges this concern.

52. Comment: Commenters (K. Baer, E. Nordberg) expressed concerns about ecosystem protection/food chain protection.

Response: The PFBC acknowledges this concern.

53. Comment: Commenter (G. MacGregor) suggested there is potential value of Timber Rattlesnakes to medicine.

Response: The PFBC acknowledges this comment.

54. Comment: Commenter (J. Taylor) cited concerns about rodent population increase associated with a Timber Rattlesnake decrease if species delisted.

Response: The PFBC acknowledges this concern.

55. Comment: Commenter (S. Boder) expressed concerned about the future status of the Timber Rattlesnake Assessment Program (TRAP).

Response: The PFBC TRAP teams continue to work on unassessed portions of the Timber Rattlesnake range in Pennsylvania (data gap assessments), as well as assist with habitat management at priority sites on public lands. The PFBC is in the process of obtaining more State Wildlife Grant funding for the TRAP team to conduct these unassessed site assessments and habitat management.

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Commenters

1. Ray Autry
2. David Badger
3. Karen Baer
4. Brian Benner
5. Henry Berkowitz
6. Ribello Bertoni
7. Tessa Bickhart
8. Brian Bielema
9. Curtis Biondich
10. William Birkhead
11. Karee Blewett
12. Stan Boder
13. Bernard Brown
14. William Brown
15. Carolyn Buckley
16. Chris Camacho
17. Colin Carey
18. Erin Cashion
19. Justin Collins
20. Steven Crescenzo
21. Philip Dunning
22. Joseph Eckley
23. Marcia Eckley
24. Susanne Enders
25. Rex Everett
26. Robert Ferguson
27. Byron Fiegel
28. Kurt Fisher
29. Barry Foster
30. Stacy Foster
31. Christopher Howey
32. Dave Hughes
33. Lindsay K
34. Ian Kanda
35. William Kayser
36. Lisa Kurtz
37. Gylla MacGregor
38. William H. Martin
39. Mark Mazur
40. Matthew McCort
41. John McDermott
42. Mehoopany Creek Watershed
Association
43. William Munroe
44. Eric Nordberg
45. Karen Pearce
46. Clyde Peeling
47. George Pisani
48. Ann Pulfer
49. Howard Reinert
50. James Rhoads
51. Thomas Root
52. William Rulon-Miller
53. David Schneider
54. Raymond Shearer
55. Choti Singh
56. Michael Skvarla
57. Christopher Smith
58. Polly Smith-Blackwell
59. Kenneth Stairs
60. Randy Stechert
61. Brandon Swayser
62. Heather Taracka
63. Fred Tarnaski
64. John Taylor
65. Courtney Thon
66. Gary Thornbloom
67. Michael Torocco
68. Corey Turben
69. Corey Uhrin
70. Thomas Warner
71. Matthew Wilson
72. Andrew Wolf
73. Robert Zumstein