

## PROPOSED RULEMAKING: MUSSEL LISTING COMMENT/RESPONSE DOCUMENT

The Pennsylvania Fish and Boat Commission (PFBC) published a notice of proposed rulemaking at 38 Pa. B. 6617 (December 6, 2008), seeking public comments on amendments to 58 Pa. Code §§ 75.1 and 75.2 (relating to endangered species; and threatened species) that list five mussel species as threatened or endangered. Specifically, the PFBC proposed to add the Salamander Mussel, Rabbitsfoot and Snuffbox to the Pennsylvania endangered species list and to add the Sheepnose and Rayed Bean to the Pennsylvania threatened species list. The original public comment period was December 6, 2008 through January 6, 2009. On January 30, 2009, the PFBC extended the comment period until March 15 and directed staff to hold a public meeting on the listings in the greater Pittsburgh area prior to the quarterly Commission meeting in April. A notice extending the public comment period until March 15 and advising the public of the meeting on March 2, 2009 in Kittanning was published at 39 Pa. B. 1074 (February 21, 2009).

During the original comment period of December 6, 2008 through January 6, 2009 and the extended comment period of January 31 through March 15, 2009, the PFBC received 169 comments: 106 comments favor the proposal, 62 comments (including 30 form letters signed by employees of a sand and gravel dredging company) oppose it and one is undetermined. The PFBC received 5 comments between January 7 and January 30, of which 4 support the proposal and 1 opposes it. These totals include written comments as well as oral comments that were made at the March 2 meeting. Copies of all public comments and the transcript from the March 2 meeting were provided to the Commissioners. Copies of all public comments (except the transcript, which is available for purchase from the court reporter) are also available on the PFBC's website at [www.fishandboat.com](http://www.fishandboat.com).

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.

### GENERAL COMMENTS

- 1. Comment: We support the PFBC's addition of the five mussel species to the Pennsylvania endangered and threatened species lists. (Commenters 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 74, 75, 76, 77, 78, 79, 80, 81, 82, 84, 85, 87, 88, 89, 90, 91, 92, 93, 94, 96, 97, 98, 99, 100, 101, 102, 103, 104, 106, 107, 108, 109, 110, 113, 114, 116, 127, 128, 133, 141, 143 and 145).**

#### Response:

The PFBC acknowledges this comment of unequivocal support for the proposed species listings.

- 2. Comment: The five mussel species proposed for listing should be protected because the threat to habitat and current limited numbers justify their listing; all five species have experienced dramatic range reduction and fragmentation nationwide and within the Commonwealth, and they continue to be threatened by industrial practices. (Commenters 3, 19, 25, 33, 48, 55, 57, 58, 76, 78, 79, 128)**

#### Response:

The PFBC acknowledges this comment.

- 3. Comment: Mussels are an historically imperiled species. Twenty-two of the fifty-two species (42%) of freshwater mussels that historically populated the Ohio Basin have been extirpated from their historical range. (Commenters 28, 70, 133)**

**Response:**

Of the nation's faunal groups, mussels are the most imperiled with the majority (70%) of 297 native species considered to be endangered, threatened, of special concern or extinct (Williams et al. 1993, Williams and Neves 1995, Ricciardi and Rasmussen 1999). Twelve species are considered extirpated (i.e., locally extinct) from Pennsylvania's portion of the Ohio River basin including six federally endangered species.

- 4. Comment: The importance of mussels as indicator species and as purifiers of water is often overlooked. (Commenters 2, 8, 14, 29, 34, 55, 60, 66, 67, 68, 75, 78, 88, 89, 92, 93, 96, 97, 99, 106, 113, 128, 133)**

**Response:**

Freshwater mussels are considered indicators of water quality. Generally, if adverse effects are occurring within a watershed, mussels are one of the first species to decline, indicating reduced water or habitat quality. Mussels serve a variety of ecosystem functions best summarized by Vaughn et al. (2008). These ecosystem services include energy transfer, nutrient cycling, and habitat quality. Mussels remove algae and other food and non-food items from the water column. These non-food items can include contaminants that are harmful to humans or other organisms. Mussel wastes are converted to food by other organisms. Mussels transfer nutrients from the water column to the river beds. Shells provide habitat and stabilize substrate.

- 5. Comment: None of the species the PFBC is proposing to add to the protected categories has been listed as threatened or endangered by the United States Fish and Wildlife Service ("USFWS") or by neighboring states. If USFWS doesn't have these species listed, why should PFBC list them? (Commenters 10, 51)**

**Response:**

As documented in a December 31, 2008 letter from the USFWS to the PFBC, all five of the proposed species are federal species of concern and two, the Rayed Bean and the Sheepnose, are federal candidate species. The USFWS strongly endorses the PFBC's adoption of the proposed listings. The state listings are critical to protect species within their borders which could ultimately prevent federal listings. This is the primary objective of state listings since if each state would protect rare species within their boundaries, the species should remain protected throughout its range. If states do not protect the species within their borders and ignore species at the edge of their range, the populations of these species would shrink further and further since they would be lost at the fringes and gradually be reduced to their core populations, which would then require federal listings. With respect to the proposed mussel listings, the relevant inquiry is how these species are treated by states encompassing their historic range, not simply by examining border states (see table below). The USFWS considers the rarity and endangerment of species throughout their range. States consider the rarity and endangerment of species within their borders. The PFBC has jurisdiction over all freshwater mussels and shares joint jurisdiction with USFWS for any federally listed mussel species. If a species meets the listing criteria for state endangered or threatened status in Pennsylvania, the PFBC is mandated to protect this species, regardless of whether or not it is listed as federally endangered or threatened.

**Table 1. State/Province status designation of each of the five proposed species throughout their range.**

Species	Status		
	Endangered	Threatened	Species of Concern
Snuffbox	IL, IN, MI, MO, MS, OH, VA, WI, Ontario	MN	KS
Rabbitsfoot	IL, IN, KS, OH, MS		
Sheepnose	IL, IN, MN, MO, MS, OH	VA	
Salamander Mussel	IL, MI, Ontario	MN, WI	IN, OH
Rayed Bean	MI, NY, OH, Ontario		IN

- 6. Comment: The proposed five species are protected by the States of Ohio and West Virginia. The State of Ohio has provided protective status for all five of the proposed mussels, while West Virginia considers all freshwater mussels as protected species. Technical experts in the State of Ohio, State of West Virginia along with experts from the US Fish and Wildlife Service support the evidence that the species should be protected. (Commenter 127)**

**Response:**

The PFBC acknowledges this comment. Like West Virginia and the states and provinces referenced in Table 1 above, state biologists and mussel experts in Pennsylvania have similarly deemed the five proposed species worthy of state protection. Again, if Pennsylvania provides regulatory protection of these species, this action may prevent these species from being listed at the federal level.

- 7. Comment: The dredging industry and the PFBC should work together to develop a protocol whereby sections of the navigable portions of the Allegheny and Ohio Rivers could be evaluated and cleared for future dredging operations where appropriate. Commenter 139).**

**Response:**

The PFBC has worked with the dredging industry in the past to prevent adverse impacts to rare species and to minimize negative impacts to the industry. The PFBC will continue to do so in the future.

- 8. Comment: Maintaining the ecological integrity of the river will ensure long-term recreational values such as fishing. (Commenter 2)**

**Response:**

The PFBC's mission is to protect, conserve, and enhance aquatic resources and provide fishing and boating opportunities. Protecting mussel populations is part of the PFBC's responsibility to maintain all parts of the ecosystem that support sport fish populations.

- 9. Comment: The listing of these species will help Pennsylvania over the long term because outdoor recreation for purposes other than hunting or fishing is becoming increasingly popular. Sensible protection of aquatic environments and its organisms (game and non-game) is consistent with ensuring that the opportunity for outdoor recreation will persist over time. (Commenter 19)**

**Response:**

The PFBC acknowledges this comment.

- 10. Comment: In addition to the strong biological arguments for listing these species, there is a compelling societal reason for giving them full protection: Pennsylvanians generally want clean streams with abundant, healthy fauna. This is reflected in their growing support for land trusts that work to protect streams and watersheds. Not listing these species would be counterproductive to the work of land trusts and other organizations, not to mention the good work of the PFBC and the US Fish and Wildlife Service. (Commenter 114)**

**Response:**

The PFBC acknowledges this comment. As noted earlier, freshwater mussels are an important element to maintaining healthy aquatic ecosystems.

- 11. Comment: Barges have lower emissions and can carry more aggregate than trucks. Therefore, allowing river dredging reduces overall air emissions. (Commenters 95, 136, 138)**

**Response:**

The PFBC acknowledges this comment.

## SPECIES LISTINGS

- 12. Comment: What listing criteria were used, and how did each species meet the criteria? (Commenters 13, 73)**

**Response:**

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 then president of the Pennsylvania Biological Survey (PABS), Jerry Hassinger (2005), that 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. 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 Mussel 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 decisions.

The preamble of the notice of proposed rulemaking summarizes the criteria used to determine species status and listing. The notice of proposed rulemaking also summarizes the justifications of the proposed action. Documentation was prepared for each species and discussed at length by PABS in the species status change/documentation forms. In response to the public comments and interest by members of industry, the environmental community and the public in this rulemaking, PFBC staff conducted further analysis, clarified the A.2 criterion after consultation with PABS, and reevaluated each of the proposed species as it relates to the objective criteria. See below for details on the criteria and how each of the five species proposed for listing met specific criteria.

**Pennsylvania Imperiled Mussel Species Listing Criteria**

Role of Different Criteria:

For listing as Endangered, Threatened, or Candidate 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.

Derivation of Criteria:

The criteria matrix has been modeled after the IUCN Red List. Criteria values have been derived from the IUCN Red List Version 3.1, the Nature Conservancy’s definitions of threatened and endangered mussel species, and a PFBC analysis of statewide mussel distribution data from multiple sources.

GENERAL CRITERIA	PABS IMMEDIATE CONCERN CATEGORIES		
	ENDANGERED	THREATENED	CANDIDATE
	SPECIFIC CRITERIA	SPECIFIC CRITERIA	SPECIFIC CRITERIA
<p><b>A. <u>Population reduction</u></b> in the form of either of the following:</p> <p><b>1)</b> 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"> <li>a) direct observation</li> <li>b) an index of abundance appropriate to the taxon</li> <li>c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</li> <li>d) actual or potential levels of exploitation</li> <li>e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.</li> </ul>	<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><b>2)</b> A population reduction of at least ___% projected or suspected to be met within the next 10 years or 3 generations, whichever is longer, where the time period must include both the past and the future, 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	CANDIDATE
GENERAL CRITERIA	SPECIFIC CRITERIA	SPECIFIC CRITERIA	SPECIFIC CRITERIA
<b>B. <u>Distribution &amp; Trends:</u></b>			
<b>1) Extent of occurrence estimated to be less than ___ square miles or</b>	<40 sq. mi.	<2,000 sq. mi.	<7,700 sq. mi.
<b>2) Area of occupancy estimated to be less than ___ square miles, or</b>	<4 sq. mi.	<200 sq. mi.	<770 sq. mi.
<b>3) Extent of occupancy in stream or river less than ___ miles</b>	<10 mi.	<50 mi.	<150 mi.
<b>4) Estimates indicating any two of the following:</b>			
a) Severely fragmented or known to exist at ___ location(s)	<6 locations	≤11 locations	≤20 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
<b>C. Population estimated to number fewer than ___ Individuals.</b>	<1,000	<3,000	<10,000
<b>D. Quantitative analysis showing the probability of extinction in the wild is at least ___% within ___ years or ___ generations, whichever is longer</b>	50% in 10Y or 3G	20% in 20Y or 5G	10% in 100Y

The following is a summary of the objective criteria (listed in *italics*) met for each proposed species based on the documentation forms for each species, the PFBC staff's reevaluation of each species, application of the criteria, expert opinion, and threats assessment:

## **Salamander Mussel**

### *CRITERIA A*

#### *A.2*

As related to a decline in the area of occupancy, extent of occurrence and/or quality of habitat, four Pennsylvania subpopulations of Salamander Mussels have been documented within the past 39 years: Allegheny River pool 5, Allegheny River pool 6, French Creek and Dunkard Creek. Presently, only two subpopulations are considered extant (i.e., still in existence, not extinct): Allegheny River pool 5 and Allegheny River pool 6. The Dunkard Creek subpopulation is considered functionally extirpated (i.e., locally extinct) because there is no evidence of recruitment. The French Creek subpopulation is considered extirpated since no live Salamander Mussels have ever been collected, despite repeated surveys. The Allegheny River pool 5 subpopulation is under direct threat from proposed commercial sand and gravel operations. The Allegheny River pool 6 subpopulation is threatened by genetic isolation, natural mortality and the threat of a catastrophic pollution event. Combined with the threats below, a projected 80% population reduction within the next 10 years is expected for the Salamander Mussel.

As related to actual or potential levels of exploitation, the lock and dam system in the Allegheny and Ohio Rivers, combined with maintenance/commercial sand and gravel dredging, have altered and destroyed Salamander Mussel habitat, eliminated habitat continuity and genetically isolated subpopulations occurring in the Allegheny and Monongahela River systems. Allegheny River pool 5 has recently received authorization for dredging. The Department of Environmental Protection (DEP) has required setbacks to protect individual Salamander Mussels pending this proposed listing, which the dredgers have appealed to the Environmental Hearing Board.

As related to the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites, zebra mussels have colonized the Allegheny River, Ohio River and French Creek. Mortality from zebra mussel infestation is expected. Anthropogenic disturbances (i.e., disturbances derived from human activities) such as acute or chronic pollution events could destroy remaining live Salamander Mussels in Dunkard Creek or either Allegheny River subpopulation. Sedimentation from oil and gas developments, forestry and agricultural practices could have an adverse effect on mussel/host interactions and reduce Salamander Mussel recruitment. The Salamander Mussel is the only known North American mussel to use an amphibian as a host. Any alteration or reduction to host habitat (e.g., loss of large flat rocks, sediment burial of large flat rocks) is likely to alter host numbers or behavior and reduce Salamander Mussel recruitment.

### *CRITERIA B*

#### *B.3*

Evidence of Salamander Mussels (represented by live, fresh dead or relic shells) has been found at 10 sites over a total of 5.8 stream miles including functionally extirpated or extirpated sites (Dunkard Creek and French Creek) and Allegheny River pool 5 and pool 6.

#### *B.4.a*

There are only three known locations for live Salamander Mussels: Dunkard Creek, Allegheny River pool 5, and Allegheny River pool 6.

*B.4.b*

*B.4.b.3.* The PFBC projects a continuing decline in the area, extent and/or quality of habitat of at least 75%. This percentage is derived from the expected loss of suitable water quality and habitat for the functionally extirpated Dunkard Creek subpopulation and considers the extirpation of the French Creek population. If the habitat for the Allegheny River pool 5 Salamander Mussel subpopulation is lost due to commercial sand and gravel dredging and natural mortality or pollution events reduce the Salamander Mussel subpopulation in pool 6, the continuing decline is projected to be at least 75%.

*B.4.b.4.* The number of areas of occupancy is conservatively projected to decline by at least 50%. Based upon recent survey data (within the past 25 years), four areas of occupancy are known. The French Creek and Dunkard Creek subpopulations are considered functionally extirpated or extirpated (= 50% decline) and if the Allegheny River pool 5 subpopulation is lost due to commercial sand and gravel dredging the decline will be greater (= 75% decline).

*B.4.b.5.* A continued decline in mature individuals is projected to be at least 50%. Only one live Salamander Mussel was found but no recruitment observed in Dunkard Creek. Because mature individuals in Dunkard Creek are not likely to produce new recruits, this subpopulation is not counted as capable of reproduction. The French Creek subpopulation is considered extirpated. A projected continued decline of at least 50% is estimated.

*B.4.b.6.* The presence of a mature but apparently non-reproducing subpopulation in Dunkard Creek and extirpated French Creek subpopulation establishes an observed decline of 50%. The reproductive and recruitment status of the Allegheny River pool 5 subpopulation is unknown. Recruitment has been observed in the Allegheny River pool 6 subpopulation.

**Rabbitsfoot**

*CRITERIA B*

*B.4.a*

As related to fragmentation, six extant locations for Rabbitsfoot are known. Based upon its historic Pennsylvania range, the Rabbitsfoot population is severely fragmented.

*B.4.b*

*B.4.b.3.* A total of thirteen historic subpopulations are known for the Rabbitsfoot: Allegheny River (pools 5, 6, and 9), French Creek, LeBoeuf Creek, Muddy Creek, Conneauttee Creek, Pymatuning Creek, Shenango River, Beaver River, Ohio River (New Cumberland and Montgomery pools), Monongahela River. Seven subpopulations are considered extant: Allegheny River (East Brady, Althom), French Creek, LeBoeuf Creek, Muddy Creek, Conneauttee Creek, and Shenango River, representing a 46% subpopulation decline. Aside from the French Creek subpopulation, remaining subpopulations are small and vulnerable to pollution events.

*B.4.b.4.* The number of areas of occupancy is conservatively projected to decline by at least 40%. Based upon recent survey data (within the past 25 years), seven subpopulations are known. The Conneauttee Creek (0.75 river miles), LeBoeuf Creek (0.75 river miles), Shenango River (0.1 river mile), Allegheny River (2 subpopulations, totaling 5 river miles) and Muddy Creek

subpopulations are considered vulnerable to the threats of chronic (sedimentation) or localized pollution events.

## **Snuffbox**

### *CRITERIA A*

#### *A.1*

As related to a decline in area of occupancy, extent of occurrence and/or quality of habitat, twenty subpopulations of Snuffbox are known from Pennsylvania: Ohio River (New Cumberland and Montgomery pools), Allegheny River (pools 5, 6, 7, 8, Kinzua Dam downstream to pool 9), French Creek, LeBoeuf Creek, Woodcock Creek, Muddy Creek, West Branch French Creek, Conneaut Outlet, Beaver River, Shenango River, Pymatuning Creek, Little Shenango River, Dunkard Creek, Little Mahoning Creek, and Lake Erie. No recent surveys have documented live Snuffbox in Lake Erie, Ohio River (New Cumberland and Montgomery pools), Beaver River, or the Allegheny River (pools 5, 6, 7, and 8). The upper Allegheny River, LeBoeuf Creek, West Branch French Creek, Conneaut Outlet, Little Mahoning Creek, Shenango River, Little Shenango River, and Dunkard Creek subpopulations are considered very small, unknown or declining. This status provides a suspected 80% population reduction decline over the past three generations (~81 years).

#### *A.2*

As related to a decline in area of occupancy, extent of occurrence and/or quality of habitat, twenty subpopulations of Snuffbox are known from Pennsylvania: Ohio River (New Cumberland and Montgomery pools), Allegheny River (pools 5, 6, 7, 8, Kinzua Dam downstream to pool 9), French Creek, LeBoeuf Creek, Woodcock Creek, Muddy Creek, West Branch French Creek, Conneaut Outlet, Beaver River, Shenango River, Little Shenango River, Pymatuning Creek, Dunkard Creek, Little Mahoning Creek, and Lake Erie. No recent surveys have documented live Snuffbox in Lake Erie, Ohio River (New Cumberland and Montgomery pools), Beaver River, or the Allegheny River (pools 5, 6, 7, and 8). The upper Allegheny River, LeBoeuf Creek, West Branch French Creek, Conneaut Outlet, Little Mahoning Creek, Shenango River, Little Shenango River, and Dunkard Creek subpopulations are considered very small, unknown or declining. Combined with threats, a projected total population reduction of 80% is expected in the next three generations (~81 years).

As related to actual or potential levels of exploitation, the lock and dam system in the Allegheny and Ohio Rivers, combined with maintenance/commercial sand and gravel dredging have destroyed Snuffbox habitat, eliminated habitat continuity and genetically isolated upstream subpopulations from other subpopulations. Large impoundments such as the Allegheny Reservoir, Pymatuning Reservoir and Shenango River Lake have also destroyed Snuffbox habitat and eliminated genetic/host connectivity to downstream subpopulations.

As related to the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites, zebra mussels have destroyed the Lake Erie subpopulation and colonized the Allegheny River, Ohio River and French Creek. Mortality from zebra mussel infestation is expected. Anthropogenic disturbances such as acute or chronic pollution events could destroy remaining live Snuffbox in Dunkard Creek or other subpopulations. Sedimentation from oil and gas developments, forestry and agricultural practices could have an adverse effect on mussel/host interactions. The Snuffbox uses a unique strategy (fish capture) to lure hosts and transmit

glochidia (parasitic larvae phase of freshwater mussels). Excessive turbidity associated with increased sedimentation would likely alter host numbers or behavior and reduce Snuffbox recruitment.

#### *CRITERIA B*

##### *B.4.a*

The Snuffbox is severely fragmented across its Pennsylvania present range. This means that the Snuffbox is found in small and relatively isolated subpopulations that may go extinct with a reduced probability of re-colonization.

##### *B.4.b*

*B.4.b.3.* Twenty historic subpopulations of Snuffbox are known from Pennsylvania: Ohio River (New Cumberland and Montgomery pools), Allegheny River (pools 5, 6, 7, 8, Kinzua Dam downstream to pool 9), French Creek, LeBoeuf Creek, Woodcock Creek, Muddy Creek, West Branch French Creek, Conneaut Outlet, Beaver River, Shenango River, Pymatuning Creek, Little Shenango River, Dunkard Creek, Little Mahoning Creek, and Lake Erie. No recent surveys have documented live Snuffbox in Lake Erie, Ohio River (New Cumberland and Montgomery pools), Beaver River, or the Allegheny River (pools 5, 6, 7, 8, Kinzua Dam downstream to pool 9). The upper Allegheny River, LeBoeuf Creek, West Branch French Creek, Conneaut Outlet, Little Mahoning Creek, Shenango River, Little Shenango River, and Dunkard Creek subpopulations are considered very small, unknown or declining. This status provides an inferred 80% decline.

### **Sheepnose**

#### *CRITERIA A*

##### *A.1*

As related to decline in area of occupancy, extent of occurrence and/or quality of habitat, nine historic subpopulations of Sheepnose are known from Pennsylvania: Allegheny River (pools 5, 6, 7, and 8), Ohio River (New Cumberland, Montgomery, and Pittsburgh pools), Monongahela River and Beaver River. This species was previously considered extirpated from Pennsylvania, i.e., a suspected 100% historic population reduction. However, a population of Sheepnose was recently discovered in the middle Allegheny River. This is Pennsylvania's only known extant Sheepnose population. In historic context, if the middle Allegheny River (Kinzua Dam downstream to pool 9) population is assumed to be a historically present subpopulation then this provides a suspected 90% population reduction over the past four generations (100 years). However, there is evidence that the middle Allegheny River population is expanding based on reproduction and recruitment. While the Sheepnose meets the endangered criterion, the PABS Bivalve Subcommittee, exercising its best professional judgment, recommended it be listed as a threatened species due to evidence of reproduction and recruitment in the one subpopulation/location in which it exists. PFBC staff concurs with this assessment.

##### *A.2*

As related to decline in area of occupancy, extent of occurrence and/or quality of habitat, nine historic subpopulations of Sheepnose are known from Pennsylvania: Allegheny River (pools 5, 6, 7, and 8), Ohio River (New Cumberland, Montgomery, and Pittsburgh pools), Monongahela

River and Beaver River. This species was previously considered extirpated. A recently discovered population in the middle Allegheny River subpopulation is the only subpopulation considered extant. This subpopulation appears to be thriving and expanding its range. With continuation of the threats detailed below, the Sheepnose status provides a projected 50% population reduction suspected to be met over the next three generations (~75 years).

A localized or catastrophic pollution event in this stretch of the Allegheny River would have a devastating impact on this population. Combined with the threats described below, the Sheepnose is likely to achieve a projected 50% population reduction over the next three generations (75 years).

As related to actual or potential levels of exploitation, the lock and dam system in the Allegheny and Ohio Rivers, combined with maintenance/commercial sand and gravel dredging have destroyed Sheepnose habitat, eliminated habitat continuity and genetically isolated subpopulations occurring in the Allegheny and Monongahela River systems. Sedimentation from oil and gas developments, forestry and agricultural practices could have an adverse effect on mussel/host interactions and reduce Sheepnose recruitment. The Sheepnose produces narrow, red lanceolate packets of glochidia called conglutinates. These conglutinates resemble fish prey items, specifically worms. Excessive turbidity associated with increased sedimentation would likely alter host numbers or behavior (e.g. ability of fish to find and consume conglutinates) thereby reducing Sheepnose recruitment.

As related to the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites, zebra mussels have colonized the Allegheny River and Ohio Rivers. Mortality from zebra mussel infestation is expected. Anthropogenic disturbances such as acute or chronic pollution events could destroy the remaining Allegheny River Sheepnose subpopulation.

#### *CRITERIA B*

##### *B.3*

As related to extent of occupancy, the Allegheny River subpopulation occupies 25 river miles. Greater than 10 river miles and less than 50 river miles meets threatened status.

### **Rayed Bean**

#### *CRITERIA A*

##### *A.1*

As related to a decline in area of occupancy, extent of occurrence and/or quality of habitat, thirteen historic subpopulations are known for the Rayed Bean: upper Allegheny River to pool 9, Allegheny River pools (6 and 8), French Creek, LeBoeuf Creek, Cussewago, Ohio River, Shenango River, Beaver River, Mahoning River, Little Mahoning, Conewango Creek, and Pymatuning Creek. Six subpopulations are considered extant: upper Allegheny River, Allegheny River pools (6 and 8), French Creek, LeBoeuf Creek, and Cussewago Creek. This status provides an observed (54%) population reduction decline over the past four generations (~80 years).

As related to actual or potential levels of exploitation, the lock and dam system in the Allegheny and Ohio Rivers, maintenance/commercial sand and gravel dredging, and water quality

degradation have combined to destroy Rayed Bean habitat, eliminated habitat continuity and genetically isolated subpopulations. Large impoundments such as the Allegheny Reservoir, Pymatuning Reservoir and Shenango River Lake have also destroyed Rayed Bean habitat and eliminated genetic/host connectivity to downstream subpopulations.

As related to the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites, zebra mussels have colonized the Allegheny River, Ohio River and French Creek. Mortality from zebra mussel infestation is likely to have occurred. Anthropogenic disturbances such as acute or chronic pollution events may have eliminated or reduced existing live Rayed Bean in one or more subpopulations.

#### A.2

As related to a decline in area of occupancy, extent of occurrence and/or quality of habitat, thirteen historic subpopulations are known for the Rayed Bean: upper Allegheny River to Pool 9, Allegheny River Pools (6 and 8), French Creek, LeBoeuf Creek, Conewango Creek, Cussewago Creek, Little Mahoning Creek, Ohio River, Shenango River, Beaver River, Mahoning River, and Pymatuning Creek. Six subpopulations are considered extant: upper Allegheny River to Pool 9, Allegheny River pools (6 and 8), French Creek, LeBoeuf Creek, and Cussewago Creek. This status provides an observed (54%) population reduction decline over the past three generations (~60 years). If one subpopulation is lost (leaving 5 extant subpopulations) due to habitat destruction or an acute/chronic pollution event (see threats described below) then this will result in a projected 62% decline over the next ten years or three generations (~60 years).

As related to actual or potential levels of exploitation, the lock and dam system in the Allegheny and Ohio Rivers, combined with maintenance/commercial sand and gravel dredging have destroyed and will continue to destroy Rayed Bean habitat, eliminated habitat continuity and genetically isolated subpopulations. Large impoundments such as the Allegheny Reservoir, Pymatuning Reservoir and Shenango River Lake have also destroyed Rayed Bean habitat and eliminated genetic/host connectivity to downstream subpopulations.

As related to the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites, zebra mussels have colonized the Allegheny River, Ohio River and French Creek. Mortality from zebra mussel infestation is expected. Anthropogenic disturbances such as acute or chronic pollution events could destroy remaining live Rayed Bean in one or more subpopulations. Sedimentation from oil and gas developments, forestry and agricultural practices could have an adverse effect on mussel/host interactions and reduce Rayed Bean recruitment. Excessive turbidity associated with increased sedimentation would likely alter available host fish numbers or behavior and reduce Rayed Bean recruitment.

### **13. Comment: With the Rayed Bean mussel being proposed for threatened status, how can the PFBC justify sending Rayed Bean mussels to other states? (Commenters 10, 13, 121, 124)**

#### **Response:**

While the Rayed Bean is critically imperiled across its range, Pennsylvania has one of the best remaining populations of Rayed Bean. The Rayed Bean status assessment (2002) that was conducted by the USFWS considered the Allegheny River population to be “one of the most important remaining rangewide.” The PFBC is committed to working with state and federal partners to ensure the continued survival and persistence of species within its jurisdictional boundaries. Accordingly, approximately 900 Rayed Bean

were collected as part of a concerted and approved conservation effort to reintroduce Rayed Bean back into a portion of its historic range in Tennessee (Duck River). Additional Rayed Beans were transferred to the Elk River, West Virginia as part of a similar effort. These reintroduced populations may provide Pennsylvania with live individuals and genetic stock should Pennsylvania's Rayed Bean population be destroyed (by threats listed in the proposed rulemaking). A similar reintroduction occurred involving the augmentation of the state endangered and federally endangered Northern Riffleshell into Ohio's Little Darby Creek.

Pennsylvania is a "responsibility" state within the national range of the Rayed Bean (this species has declined 71% from historic levels throughout its range). One of the tools used to sustain the species existence is working with other state and federal agencies to establish new populations using genetic stock from the Allegheny River. Should Pennsylvania not have the ability to protect this species, Pennsylvania's population may become locally extinct. Until protective measures are in place, reintroductions and augmentations are tools to be utilized to ensure the continued survival of the species. Ultimately, these transplant efforts are an effort to assist recovery of the species and, given appropriate success, may lead to a "de-listing" of a proposed state threatened and federal candidate species.

**14. Comment: It appears that the Rayed Bean and Salamander Mussels are more common and more numerous than the historical record indicates. For example, the federal status assessment prepared for Rayed Bean states, "Based on historical collections, it would appear that [in Pennsylvania] the Rayed Bean is more abundant now than it was historically." (Commenters 121, 122, 123, 124)**

**Response:**

There are relatively few historic collections of the Rayed Bean and Salamander Mussel. Therefore, the comment appears to be correct based on documentation of an Allegheny River population expansion in the Rayed Bean status assessment (Butler 2002). However, when compared to recent collection information, the species appears to be declining (see response to Comment #12). Indeed, when the Rayed Bean is compared to the two other state listed species, the Northern Riffleshell (*Epioblasma torulosa rangiana*) and Clubshell (*Pleurobema clava*), recent data indicates that the Rayed Bean is less common than species currently afforded state and federal protection status. Both the Northern riffleshell and Clubshell co-occur with Rayed Bean but Rayed Bean occurs at significantly lower density (Villegla and Johnson 2006, Smith and Crabtree 2005). Villegla and Johnson (2006) reported densities of mussels within a 51 km stretch of the Allegheny River between Tionesta and Oil Creek – Northern Riffleshell (0.888 mussels/m<sup>2</sup>), Clubshell (0.1503 mussels/m<sup>2</sup>), and Rayed Bean (0.0084 mussels/m<sup>2</sup>). Combined with current low densities (although widely distributed) the Rayed Bean is fragmented and genetically isolated from portions of its historic range. These fragmented populations are threatened by a litany of point source and non-point source pollution as well as physical habitat destruction caused by altered flow regimes (e.g., Kinzua Dam, Shenango Reservoir, etc.), commercial and maintenance sand and gravel dredging. Thus, despite the "appearance" of Rayed Bean being more common or numerous, it clearly is not when considering more recent information and comparison to state and federally protected endangered species, the Northern Riffleshell and Clubshell.

The Salamander Mussel has only been collected in four locations since 1970. Only three locations (within the last 25 years) have been added since the first observation in 1970. As noted above, the size of the collections has been relatively small, and relatively few live individuals have been observed. For example, less than 100 live individuals have been documented in Pennsylvania. These populations occur in discrete and disjunct locations and are not expanding when considering the threats to the species identified in the response to Comment #12.

**15. Comment: The Salamander Mussel may be an invasive species. (Commenter 130)**

**Response:**

The PFBC is not aware of any documented introductions of Salamander Mussels into the Allegheny River pools. There is no data that supports an assertion that Allegheny River Salamander Mussel populations were artificially introduced. The first known collection of Salamander Mussel in Pennsylvania was by Stansbery in 1970, reported in Clarke (1985). An examination of the Salamander Mussel's historic range indicates that this species and its host, the mudpuppy, occur throughout the Mississippi River drainage and in the Lake Erie and Lake Huron drainages. The Salamander Mussel is known to occur or have occurred in New York, Ohio, West Virginia and Ontario, all surrounding states or provinces that share the Ohio River basin or the Lake Erie basin.

**PFBC'S LISTING CRITERIA AND IUCN METHODOLOGY**

**16. The Bivalve Subcommittee of PABS published in their November 2008 newsletter that the Bivalve Subcommittee suggested some alternatives to the proposed listing criteria and that data gathering and analysis for alternative criteria have begun. How can the PFBC list species when the listing criteria have not been finalized? (Commenter 73)**

**Response:**

The PFBC mussel criteria were finalized in August 2008. The PABS and the PFBC have been exploring additional objective criterion to potentially add to the current mussel criteria. The alternative referenced in the November 2008 newsletter is referring to a criterion that focuses on analyzing rarity by looking at the spatial aspects of a species distribution within the six major watershed basins of the Commonwealth, called the "Sum Proportion of Watersheds Occupied." While not fully developed for mussels, this method is being used as part of the fish listing/de-listing process by the PABS Fishes Technical Committee. The method is not intended to replace the listing process but rather to strengthen its objectivity through the use of occurrence data and spatial analysis.

**17. Comment: This Red List methodology was developed by several countries to provide a consistent system for listing species globally and improve objectivity in deciding whether a species should be listed. Very few invertebrates, and especially aquatic invertebrate species, have been examined using the IUCN Red List methodology, and almost none at the regional level. (Commenter 13)**

**Response:**

The commenter acknowledges the objectivity of the IUCN process but is incorrect about the statement regarding the lack of aquatic invertebrates being examined using IUCN Red List methodology. The 2009 IUCN Red List includes 273 mollusks (including freshwater mussels) found within the United States. The IUCN Red List includes the Sheepnose and Salamander Mussel, two species proposed for Pennsylvania endangered status. The PFBC required a detailed summary and analysis of available survey information and provided more information to the public than information available through IUCN.

**18. Comment: Many mussel species in the Allegheny River are near the northeastern extent of their range. Why should the PFBC list these species that may never have been very abundant in Pennsylvania? (Commenters 13, 122, 123)**

**Response:**

Pennsylvania's portion of the Ohio River basin (15,614 square miles) does represent the northeast extent of the range for many freshwater mussel species. However, Pennsylvania has the responsibility to protect species within its jurisdictional borders. If Pennsylvania did not protect a species because the species was considered at the edge of its range, the species would likely become extinct in Pennsylvania (i.e., extirpated) due to inadequate protection. This "edge of range" precedence could set off a detrimental, cascading series of events. With the Pennsylvania population considered extirpated, another state would then be considered at "the edge of its range." If the Pennsylvania precedence prevailed, then Ohio, for example, too, would not have a basis for protecting Salamander Mussel or other species because they are on "the edge of its range." The danger is that the very definition of "edge of range" would continue to shrink until the species was globally extinct. If the Salamander Mussel or other species proposed for listing became extirpated in Pennsylvania, then the range of these species would be significantly contracted to the detriment of the species rangewide and to the natural heritage and biodiversity of the Commonwealth specifically. Conservation of a species' genetic diversity requires secure metapopulations both at the core and edges of a species' geographic distribution. It is the intention of the PFBC to strive toward protecting, conserving and enhancing species whose life histories and distribution include habitats within Pennsylvania's boundaries.

**19. Comment: The PFBC's "modified" criteria are far more stringent than those used in IUCN's Red List. This seems to skew (or bias) the process toward a finding of "protected" status. This is not in line with what other states use to list species. (Commenters 13, 122)**

**Response:**

PFBC staff did modify the IUCN criteria. For example, the PFBC added the petition and documentation process that is not in the IUCN method. PFBC staff accepted modifications proposed by the Hassinger Report (2005) that examined this method and the modification made by Florida to adapt the listing at a state/local level. With respect to the criteria regarding population decline, PFBC staff focused on the decline of meta-populations and/or sub-populations rather than the decline of individuals across all meta- and sub-populations. The PABS Technical Committees for fish and the bivalves modified the criteria to apply to linear systems. The justification for this change stemmed from the fact that a significant number of aquatic species in Pennsylvania live in linear water bodies, which are not adequately captured in the unmodified IUCN criteria. The "Red List methodology was developed by several countries to provide a consistent system for listing species globally." In general, the divergence from the IUCN criteria reflects an effort to convert a global listing process to a state/local listing process. This is consistent with the IUCN method itself, which contemplates modification of the criteria to smaller geographic areas. Some criteria that are found in the IUCN have been omitted from the criteria used by Pennsylvania. Because meeting any one criterion would qualify a species for listing, the omission of certain IUCN criteria in the Pennsylvania method actually decreases the chances of a species being listed. Most other state jurisdictions rely exclusively on expert opinion to list species. The PFBC chose to rely on a more objective listing process. Moreover, materially identical criteria were used to document and support the PFBC's recent delisting of five fish species. If the criteria were biased toward listing, these species would not have been delisted.

**20. Comment: How were sources of uncertainty addressed by the PFBC in the listing process? (Commenter 13)**

**Response:**

PFBC staff recognizes that levels of uncertainty occur given species' unique life histories and their habitat changing over space and time. Abundances were not used in the criteria analyses to eliminate uncertainties in collector bias, method of collection used, and measurement bias. Poor quality data was not used in the analyses. Species occurrence data was quality checked. If data was from an unreliable source, it was excluded from the analysis. Locational uncertainties were minimized by using presence/absence data in the context of metapopulations. For some species, historical data was limited. The PFBC is confident that the data used in the analysis is high quality and sufficient in coverage (breadth of streams surveys), which has improved certainty. The IUCN also states that in the context of uncertainty, cases where there are "evident threats to a species, threatened listing shall be justified, even though there may be little direct information on the biological status of the taxon itself." Given the obvious threats to the species in this listing package and their apparent rarity, listing these species is justified.

**21. Comment: IUCN uses defined criteria in determining a "qualified decline" and a "qualified reduction." How did PFBC staff "qualify" population decline or reduction? (Commenter 13)**

**Response:**

The IUCN method defines both a "reduction" and a "continuing decline." The PFBC's analysis of the proposed listing used those definitions. The IUCN definitions are as follows:

"Reduction" – A reduction is a decline in the number of mature individuals of at least the amount (%) stated under the criterion over the time period (years) specified, although the decline need not be continuing. A reduction should not be interpreted as part of a fluctuation unless there is good evidence for this. The downward phase of a fluctuation will not normally count as a reduction.

"Continuing decline" – A continuing decline is a recent, current or projected future decline (which may be smooth, irregular, or sporadic) which is liable to continue unless remedial measures are taken. Fluctuations will not normally count as continuing declines, but an observed decline should not be considered as a fluctuation unless there is evidence for this.

**22. Comment: Did PFBC staff base population decline on national rates rather than Pennsylvania rates of decline? If so, this would appear to interject a bias into the process and would seem unreasonable since species vulnerability in Pennsylvania is the issue under State law, not vulnerability in other jurisdictions. (Commenter 13)**

**Response:**

The PFBC based population decline on Pennsylvania rates of decline. No population reduction information was derived from out-of-state populations for any of the mussel species proposed for listing.

**23. Comment: In terms of reduction of population size, PFBC uses smaller percentage reductions over longer time periods than the IUCN Red List, without explanation as to why this is appropriate. (Commenters 13, 122)**

**Response:**

In adapting the IUCN method (a global method) for use in Pennsylvania, PFBC staff did use a smaller percentage for the population reduction criteria as used in the IUCN method. This was done in part to compensate for the differences in a global listing process to a state listing process and also in part because

the Pennsylvania regulatory categories differ from the IUCN categories. IUCN method uses critically endangered, endangered and vulnerable categories, which do not necessarily translate into the regulatory endangered, threatened and candidate categories used by the PFBC. Florida made a similar reduction in the percentage used in modifying the criteria. Canada, when modifying the IUCN criteria for use within its political boundaries, used even smaller percentages than either Pennsylvania or Florida. Use of these specific percentages was discussed and approved by the technical experts in PABS.

**24. Comment: The PFBC uses a lower number of known locations for each threat level than IUCN, which necessarily will result in a more conservative listing of taxa based on limited data, without explanation for doing so. (Commenters 13, 122)**

**Response:**

IUCN method uses critically endangered, endangered and vulnerable categories, which do not necessarily translate into the endangered, threatened and candidate categories used by PFBC. Applying a “global” location criterion for a species to be considered endangered at the state level would represent too critical an imperilment to effectively reverse. The PFBC’s goal in listing species as threatened or endangered is to increase protection of these animals through the environmental permitting process as outlined in DEP’s regulations to eventually bring about a recovery of these populations so they may be delisted and to increase awareness of the status of these animals.

**25. Comment: For population size, the PFBC uses a higher number of individuals at each threat level than IUCN. For example the highest threat category under the PFBC's system is endangered at <1000 individuals, whereas the highest threat category in the IUCN system is critically endangered at <250 individuals. Thus, the PFBC considers larger population size to be threatened or endangered than IUCN and offers no explanation as to why a significant higher level was chosen. (Commenters 13, 122)**

**Response:**

The PFBC did use different numbers of individuals for the population estimate of individual criterion than used by the IUCN. As noted previously, this was done in part to compensate for the differences in a global listing process to a state listing process and also in part because the Pennsylvania regulatory categories differ from the IUCN categories. Further, this criterion was not used to justify the listing of any of the proposed mussel species. See response to Comment #12 above for more details.

**26. Comment: Why did the PFBC apply the listing method to western Pennsylvania only? This is not how the Red List methodology is to be applied. (Commenter 122)**

**Response:**

Pennsylvania is somewhat unique in that it can be divided into a number of different physiographic regions that represent different faunal types. Six drainage basins are located within Pennsylvania including the Delaware, Susquehanna, Potomac, Genesee, Lake Erie and Ohio River basins. Two mussel fauna types exist within Pennsylvania: the Interior Basin fauna (Ohio River Basin and tributaries, including Lake Erie – see below for explanation) and Atlantic Slope fauna (Delaware, Susquehanna, Potomac Basins and their tributaries). The majority of western Pennsylvania lies within the Ohio River basin. Since the Lake Erie basin (northwest Pennsylvania) was historically part of the Ohio River basin (via stream capture during glacial advances), the Lake Erie basin mussel data was considered as part of the proposed listings. The other major drainages in Pennsylvania, the Delaware, Susquehanna and

Potomac, are not considered part of the Ohio River basin and larger Interior Basin (which includes the Mississippi River Basin) and generally consist of a completely different mussel fauna (with a few exceptions that may be explained by stream capture). See response to Comment #12 for details on how the IUCN methodology was applied to Pennsylvania.

**27. Comment: PFBC staff modified the Red List methodology by focusing on trends of individual populations of a mussel species, rather on the species as a whole. This biases the methodology toward listing. (Commenter 122)**

**Response:**

The IUCN method was modified for use on a state basis (Pennsylvania). See the IUCN criteria for further explanation. Multiple states comprise the entire population of a species – assessment of the range-wide population is the job of the USFWS.

**28. Comment: Mussels found in different areas of a single Allegheny River pool separated by water depths (>10 m) should be identified as separate locations using IUCN methodology. Similarly, the Salamander Mussel would also not be considered vulnerable at all because it has been reported in 11 locations and there has been less than a 50% decline in occurrence extent since the 1970s. (Commenter 13)**

**Response:**

The commenter confuses the definition of a location with sites within a location. While contiguous habitat is an important factor for determining the extent of occupancy in a stream or river mile, it does not have a bearing on the determination of locations for criteria B.4.a. Location is defined by IUCN as a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the taxon present. The PFBC mussel listing process used the IUCN definition of a “location.”

For the specific analysis for the listing of the Salamander Mussel, see the response to Comment #12 above.

## **THREATS**

**29. Comment: The perceived threats noted by PFBC are nearly identical for all five mussel species proposed for listing. (Commenter 13)**

**Response:**

Different watersheds in the Ohio Basin (all mussels proposed are from the Ohio Basin) face different threats due to impacts associated with industry, vulnerability of the mussel to threats, and vulnerability of the mussel's host to threats. The threat assessment relied upon an examination of the life history of species in question, knowledge of existing scientific literature, and known conditions of areas occupied by these species, including but not limited to existing permitted activities, basin bathymetry, and physical observation. Threats to the proposed species were generally the same for species whose ranges overlapped. The activities noted would threaten any freshwater mussel species. The individual threats noted in the documentation forms and in the notice of proposed rulemaking characterize the threats based on watershed location. Individual species also differed in threats to host species. These threats would

threaten any freshwater mussel species, but given the rarity of the proposed species, the severity and impact of the threats are magnified.

**30. Comment: The effects of the lock and dam systems on freshwater mussels appears to be under-emphasized in the PFBC's threat assessment. (Commenter 13)**

**Response:**

The threat assessments for each proposed species do address navigational locks and dams as a threat to dispersal via their hosts. Impoundments lead to population isolation when dispersal of glochidia (mussel larvae) or the host species is obstructed. Population isolation prohibits the natural interchange of genetic material between populations. With the continued presence of the lock and dam system, the first step to recovery is to list these species as endangered, threatened or candidate, so all future permitting actions by DEP will require applicants to demonstrate that the permitted activity will not have a deleterious effect on the species. This could help make recovery possible. For example, the PFBC has recently delisted five fish species in this river system showing, at least in part, that protection efforts in this system can have beneficial effects for the species even with the continued existence of the lock and dam system. Commercial sand and gravel and navigational dredging have had a substantial impact on marginalizing mussel habitat within the existence of the lock and dam system. The threats posed to freshwater mussels by dredging activities are well documented in the scientific literature (e.g., Watters 1999). These threats include but are not limited to increased water depths, reduction of flow, decrease in dissolved oxygen, loss of physical habitat for mussels and their hosts, and increased siltation, in addition to the physical removal and destruction of the species itself by dredging. Mussel diversity and abundance is significantly lower in dredged versus undredged areas within the pools of the Allegheny created by the lock and dam system (Smith and Meyer 2008).

**31. Comment: The statement made by the PFBC that "the river bottom habitat in the Allegheny River is rapidly being depleted by dredging" is neither correct nor based on any factual information. In fact, it is in Pool 5, a pool that has been permitted for dredging for over 50 years, in which the "historic" (1970) and current (2008) individuals of the Salamander Mussel have been recorded. (Commenters 13, 132)**

**Response:**

This comment refers to a recent permitted activity that requested authorization to dredge in a portion of Pool 5 of the Allegheny River. The PFBC has recent bathymetry information that illustrates the physical differences between undredged and dredged mussel habitat. Most areas that still have rare or protected species occur in areas of undredged habitat or in buffers around islands.

**32. Comment: Qualitative information is presented by the PFBC regarding threats to mussels. While there may indeed be potential threats, the intensity or likelihood of these threats over time is not addressed nor is it apparent why these threats are suddenly enough to propose listing these five mussel species. (Commenters 13, 122)**

**Response:**

The PFBC has documented numerous specific and general threats to the five proposed mussel species. For example, the threats posed by the lock and dam system and dredging are discussed in response to Comment #30 above. Chemical spills and pollution events have been known to have a lethal effect on

freshwater mussels, including the very mussels that the PFBC seeks to list in the proposal. For example, as reported by the Ohio River Valley Ecosystem Team (Butler 2002):

Numerous streams throughout the range of the Sheepnose have experienced mussel and fish kills from toxic chemical spills, particularly in the upper Tennessee River system in Virginia where several major spills have been documented (Neves 1986, 1991; Jones et al. 2001). Catastrophic pollution events, coupled with pervasive sources of contaminants (e.g. municipal and industrial pollution, coal-processing wastes), have contributed to the decline of the Sheepnose in the Clinch River over the past several decades (Neves 1991). An alkaline fly ash pond spill in 1967 and a sulfuric acid spill in 1970 on the Clinch River at Carbo, Virginia, caused a massive mussel kill for up to 12 miles downstream from a power plant site (Cairns et al. 1971). Natural recolonization has not occurred in the impacted river reach (Ahlstedt 1991b), possibly due to persistent copper contamination from the power plant at Carbo (Wilcove and Bean 1994). One recent major spill in the upper Clinch River in 1998 eliminated over 7,000 mussel specimens of several species, which were found freshly dead (Jones et al. 2001). The death toll included at least 254 specimens of three federally listed species but was thought to be much higher (S.A. Ahlstedt, USGS, pers. comm., 2001). An especially catastrophic spill in 1999 impacted an approximately 10 mile stretch of the Ohio River and resulted in a total loss of mussels. Roughly one million mussels, including the Sheepnose and two federally listed species, were estimated to be lost (W.A. Tolin, pers. comm., 2002).

Pennsylvania is not immune to these types of catastrophic events. For example, in 2006, approximately 42,000 gallons of sodium hydroxide were accidentally spilled into Sinnemahoning Portage Creek and the Driftwood Branch of the Sinnemahoning Creek in McKean and Cameron Counties. This spill killed all aquatic life for eleven stream miles and killed most aquatic life for an additional 21 stream miles. Unfortunately, given the sparse and genetically isolated sub-populations of many of the proposed species, a localized pollution event (which are much more common in Pennsylvania) could have devastating impacts. Examples of some major oil spills that have occurred on Pennsylvania's large rivers include the Ashland oil spill on the Monongahela and Ohio Rivers in 1988, the Buckeye oil spill on the Allegheny River in 1995, the M/T Kentucky spill on the Delaware River in 1995, and the Jahre Spray oil spill on the Delaware River in 1996.

**33. Comment: Mussel experts often cite poor water quality as a major factor affecting mussel populations in the early-mid 20th century. Improvements in certain mussel populations have occurred as well, as evidenced by the improved recruitment of species previously considered very rare (e.g., fragile papershell). (Commenter 13)**

**Response:**

Water quality is one of many important factors that affect mussel populations. Mussels also require suitable depth, suitable substrate and available hosts. The PFBC has considered improvements in water quality in the Ohio River Basin; however, those improvements are not necessarily reflected in all waters within the Basin, as many streams remain degraded. As a taxonomic group, freshwater mussels are more sensitive to poor water quality than other aquatic species (such as fish). The relevant inquiry is not whether water quality has improved but rather has water quality improved to the extent necessary to allow expansion and recolonization of rare mussel species. While the Allegheny and Ohio Rivers have improved in water quality, the mussel population is slow to recover due to lack of available habitat, restriction of host fish movement and other factors. The improvement of the recruitment of the Fragile Papershell, while encouraging, does not necessarily translate to successful recruitment of rare mussel

species. Fragile Papershell are a short-lived, thin-shelled colonial species that (for mussels) have a relatively high tolerance for marginal habitat. If water quality had improved to such a point as suggested in the comment, the PFBC would expect to see similar improvements for other Interior Basin mussel fauna, such as the Rough Pigtoe, the Orange-foot Pimpleback, Butterfly Mussel, Pink Mucket, Ring Pink, Hickorynut, Pyramid Pigtoe, Monkeyface and Pimpleback. To date, this has not occurred.

**34. Comment: It would not be prudent to expend resources to protect mussel species in the portions of Dunkard Creek that currently experience severe water quality impairment only on the basis of historical occurrences. Agency oversight should be focused on protecting stream reaches with known populations of listed mussel species. (Commenter 73)**

**Response:**

Stream reaches harboring known populations of listed mussels are an agency priority. As populations of species are analyzed, priority populations will be targeted for restoration. This listing package fulfills a step in the prioritization process, with the ultimate goal of achieving stream protection and restoration. If water quality could be restored, historic Salamander and Snuffbox habitat could be re-established in Dunkard Creek. Water quality improvement in Dunkard Creek and its tributaries could lead to a cumulative improvement to the Monongahela River and Ohio River water quality. Dr. Art Bogan (1993) identified Dunkard Creek as the most diverse mussel fauna in the Monongahela River basin and recommended that this stream be the focus of combined preservation and protection efforts (West Virginia and Pennsylvania).

**35. Comment: Sand and gravel mining has been demonstrated to cause long-term damage to mussels and their habitat. (Commenters 28, 70)**

**Response:**

Instream habitat alteration has been identified as causing long-term, detrimental effects on freshwater mussels (Watters 1999). Research suggests that dredged areas contain poor mussel habitat (Hubbs et al. 2006). Aside from the physical removal of mussels from riverbeds, sand and gravel dredging activities lead to increases in suspended solids and contaminants that may smother or adversely affect downstream mussels (Watters 1999). The physical alteration of habitat increases river depth, reduces river velocity, reduces photosynthesis (thereby increasing BOD stress), and creates unstable substrates vulnerable to headcutting. Hubbs et al. (2006) indicated that mussel density, abundance, and species richness were significantly lower at dredged versus reference sites (undredged) and suggested that mussel populations are slow to recover. Siltation in previously dredged habitat creates habitat for silt tolerant species, species that replace the previous riverine mussel fauna.

**36. Comment: The Sheepnose occurred in the Monongahela River almost 100 years ago. This species has not been collected from these rivers during recent surveys and is possibly extirpated in Pennsylvania, most likely because of implementation of the lock and dam system, dredging, and impacts from industrial and mining discharges to the rivers. (Commenter 73)**

**Response:**

Sheepnose was once thought to have been extirpated from Pennsylvania but was rediscovered in the Allegheny River mainstem in 1991. The Monongahela River was severely impacted by industrial and mining discharges and alteration of habitat due to locks and dams and maintenance dredging. Improvements in water quality, however, have brought many fish species back into the Monongahela

River that had been previously extirpated. The Monongahela River system will be considered for future Sheepnose restoration sites. The greatest cause of the Sheepnose decline in Pennsylvania can be attributed to loss of habitat due to the lock and dam systems and maintenance/commercial sand and gravel operations. The extant population of Sheepnose is threatened by increased cumulative effects of sedimentation and the threat of a single catastrophic event.

## SAMPLING

**37. Comment: The Salamander Mussel has not been formally studied and is difficult to find and the only way we can determine its status is through a dedicated and rigorous sampling effort. (Commenters 124, 132)**

### Response:

There have been ongoing and recent rigorous sampling efforts to detect mussel species in Pennsylvania's Ohio River basin. Most mussel surveys tend to be inclusive, meaning that these surveys examine the entire search area for any and all mussel species present, including Salamander Mussel and Rayed Bean. The PFBC acknowledges that these species can be difficult to detect; however, there are qualified surveyors (e.g., professional malacologists) in Pennsylvania who are familiar with and aware of the mussel species that occur both currently and historically in Pennsylvania. These surveyors are also familiar with the individual species' life histories and habitats within the drainages they are qualified to survey. The streams and rivers of the Ohio River basin have been surveyed with a variety of valid techniques and surveying protocols by a number of qualified mussel surveyors. The PFBC examined and used only the reliable data collected as a method to reduce uncertainty.

**38. Comment: Very little is known about the abundance of the Salamander Mussel and at best there are only a handful of "studies" done to assess the abundance of this species, and to date, no "follow-up" studies have been done to confirm or refine earlier findings. (Commenter 51)**

### Response:

Most mussel surveys are community-based, in other words, not typically species-specific. Site-specific density or abundance data has been reported quantitatively and semi-quantitatively (probability-based sampling) and qualitatively (e.g. catch-per-unit-effort). Several large-scale quantitative, semi-quantitative and qualitative studies have assessed the rivers and streams in the Ohio Basin. For the Salamander Mussel, intensive survey work has been conducted in the Allegheny River pools (4-8) to assess the mussel community. These survey efforts utilized bathymetric mapping to focus surveyor attention on areas of existing (i.e. non-dredged) habitat and confirmed ("follow-up") earlier records. Follow-up survey work was conducted in Dunkard Creek that confirmed the presence of a single, live Salamander Mussel and a fresh dead specimen. The French Creek drainage has been extensively surveyed by multiple personnel from multiple organizations and resource agencies. The French Creek site where evidence of Salamander Mussel was identified was surveyed on multiple occasions in an effort to detect live specimens, with no live specimens being found.

**39. Comment: There have been no follow-up studies to determine whether the purported "sighting" of the Salamander Mussel in Greene County was other than an anomaly. (Commenter 51)**

### Response:

While not considered a “species-specific study,” the 1993 observation of Salamander Mussels (shells) in Dunkard Creek was part of a larger, statewide survey. The presence of live Salamander Mussels in Pennsylvania’s portion of Dunkard Creek was confirmed in 1994 (Doug Wood (PA DEP)) and a live individual confirmed at the same site in 2008 (Welte). Salamander Mussels may have been more prevalent in Dunkard Creek at one point in time; however, sedimentation from agriculture and construction activities and mining discharges appear to have adversely affected the Dunkard Creek mussel population as a whole (e.g., Snuffbox, Wabash Pigtoe, Three-ridge, etc.).

**40. Comment: Knowing that the Salamander Mussel prefers "sand or silt under large flat stones in swift current" it is nonsensical to consider Pool 5 as having important habitat for this species. The few Salamander Mussels found in Pool 5 over the past 20 years of surveys does not suggest a viable population of this species. (Commenter 13)**

**Response:**

Salamander Mussels have been found at more than one site in pool 5 of the Allegheny River. Given the relative rarity of the Salamander Mussel, this makes pool 5 an important habitat for the species. Bathymetry data indicates that Salamander Mussel occurs in undredged portions of Pool 5 of the Allegheny River, not in dredged portions of Pool 5.

**41. Comment: If the same amount of sampling effort were expended in the non-navigable Allegheny and tributaries having apparently suitable habitat, it is quite possible that viable populations of the Salamander Mussel would be identified. (Commenter 13)**

**Response:**

Intensive surveys have been conducted throughout Pennsylvania’s Ohio Basin, supporting the PFBC’s position that sufficient data has been presented warranting the listing of each of the five species. Considerable sampling effort has been expended in the un-pooled Allegheny and its tributaries and that data has been considered as a part of this listing. The Salamander Mussel has been located in Dunkard Creek in Greene County, and Salamander Mussel shells have been found in French Creek in Crawford County.

**42. Comment: Large river mussel surveys were historically conducted using brailing methods. Brailing methods under-reported the presence of mussel species. This could mean that the proposed “protected” species are as common as “common” species. There is not enough information from recent surveys to justify listing the proposed species as threatened or endangered. Moreover, the PFBC states that enough information has been collected to support the proposed listing; however, the PFBC does not define what constitutes sufficient or enough information. (Commenter 10)**

**Response:**

Sampling techniques continue to evolve as more is learned about sampling bias and sampling efficiency. As noted in the comment, studies have concluded that brailing for mussels is an inefficient and biased sampling methodology for mussels. Brailing provides a small sample size highly biased towards larger, heavier-shelled species typically found at the substrate surface. Small mussels or mussels that are completely buried or covered by large rocks (e.g., Salamander Mussel) would be missed using brailing techniques. Activities were permitted utilizing brailing survey techniques in the pooled portions of the Allegheny and Ohio Rivers until 1997 when recognition of this technique’s inefficiencies necessitated that a more quantitative and repeatable sampling protocol be developed and implemented. The comment

discusses deep-water sampling techniques but does not consider that these animals are also found in shallow-water habitats. Much of the data that supports this Ohio River Basin listing package comes from shallow-water habitat collections. Shallow-water habitat, for purposes of this listing package, includes waters whose depths are less than 20 feet. In addition, the brailing data that PFBC is aware of came only from pre-dredging mussel surveys performed in deep water riverine habitats. There has been enough non-brailing data collected using verifiable and repeatable mussel surveying techniques to support the PFBC's reliance on this data and conclusions regarding the proposed listing.

The PFBC determined that the documentation and supporting information demonstrates that each species meets the minimum criteria to be listed as either endangered or threatened. For details on the criteria and how each species meets the minimum conditions for endangered or threatened, see response to Comment #12 above. Several large-scale quantitative, semi-quantitative and qualitative studies have assessed the rivers and streams in the Ohio Basin. In addition, the PFBC considered a multitude of studies and surveys resulting in 8,400 datapoints that were used in the listing analysis/justification.

## **DATA**

### **43. Comment: What information was used to conduct data analysis? (Commenter 10, 13, 73)**

#### **Response:**

Thousands of records were reviewed during the status assessment of the five species proposed for listing. Some data was collected using probability-based sampling designs, other data was collected using presence/absence surveys. Presence/absence surveys and probability-based sampling are generally accepted as being sufficient for detection of rare species. Since complete spatial coverage of a drainage would be extremely time and cost-prohibitive (and never conducted in the US), other quantitative and semi-quantitative sampling methods have been utilized for large-scale survey efforts in the Ohio Basin and provide the majority of data used for assessing the status of each of the five species proposed for listing.

### **44. Comment: Did the PFBC document the geographic extent of recent surveys? Did the PFBC estimate population sizes and population viability? Did the PFBC indicate data gaps or under-surveyed streams within species historic ranges? (Commenter 73)**

#### **Response:**

The PFBC did address the following in the species documentation forms and associated maps: geographic extent of each species, current and historic occurrences, number of known populations. This information was outlined and summarized in the notice of proposed rulemaking. Data from some population studies were also included in the analysis, but due to the effort, time, costs, and problems with population viability analyses (PVAs), few exist. The PFBC's decision to list the species and expert opinion of the PABS Bivalve Technical Committee considered the effort was sufficient to list the five mussel species. Survey type and effort information was reviewed by the PFBC in the context of its proposed listing determination

### **45. Comment: Mussel surveys in western Pennsylvania appear to be sparse. In general, there appears to be very few surveys conducted in western Pennsylvania using efficient sampling methodology. (Commenter 13)**

#### **Response:**

The PFBC would not characterize the mussel sampling data for Western Pennsylvania as sparse. Several large scale surveys have been conducted in Pennsylvania's Ohio River Basin by qualified mussel surveyors. Different survey methods have been applied to answer different questions (e.g. presence/absence, density). In reference to pooled portions of the Allegheny and Ohio Rivers, beginning with protocols developed in 1997, the resource agencies have improved sampling designs to increase confidence (thus reducing uncertainty) in a surveyor's ability to detect rare species. The mussel surveys relied upon by the PFBC included large rivers and medium/smaller streams. The validity for survey methods of medium/smaller streams have not changed considerably in the past 10 -15 years. (Smith and Crabtree 2005, Smith and Meyer 2008 and Villella and Johnson 2006).

**46. Comment: There exists only a very limited set of data that has been gathered on the extent to which the population of any of these species is truly at risk. This is the case because the actual number of scientific surveys done in Pennsylvania (and elsewhere) to determine the abundance and location of these (or any other) mussel species have, historically, been extremely limited. (Commenter 10)**

**Response:**

A number of comments assume that a very limited set of data has been gathered on these species or that very few surveys have been performed. These assumptions are erroneous. During the past 25 years, a large number of comprehensive surveys have been conducted, especially in the Ohio River Basin. This data also includes scientific collections from a variety of sources, including government (USFWS, USGS), non-government (The Nature Conservancy, Western Pennsylvania Conservancy), academia, museums and other private collections. After a thorough review of thousands of records, it is clear that there have been a limited number of collections of the proposed species, which is not due to lack of surveying effort but rather the low abundance of the species. The low encounter rate provides evidence of the rarity of the listed species.

**47. Comment: A major source of historic mussel data appears to be derived from pre-dredging mussel surveys. Therefore, the past 20 years of sampling was essentially limited to the navigable Allegheny and Ohio pools, as opposed to upper reaches of the Allegheny or tributaries. (Commenter 13)**

**Response:**

Multiple surveys have been conducted throughout the Ohio River Basin over the past 25 years for purposes other than pre-dredging surveys. These surveys include surveys conducted by academia, consultants, non-governmental organizations and state and federal resource agencies. The purposes of these surveys ranged from effects analyses for permitted actions, presence/absence surveys, population assessments and research.

**48. Comment: The proposed rulemaking does not specify whether historical records (>25 years old) are used in the listing criteria or only recent records are considered. (Commenter 73)**

**Response:**

Historic data are not always available for all species (e.g., Salamander Mussel). Where historic data were available, it was used to calculate a percent reduction in locations of subpopulations. The objective criteria ultimately rely on more recent survey data (e.g., within the last 25 years).

## HABITAT

**49. Comment: Endangered and threatened species share characteristics such as unique habitat requirement, low reproductive output or extreme rarity that makes them vulnerable to extinction. Rarity by itself does not necessarily imply implicit loss. (Commenter 123)**

**Response:**

While there is truth to this comment, rarity leaves a species more vulnerable to threats. Habitat loss is significant to all species. In fact, across all taxa nationally as well as internationally, the primary reason for species decline and extinction is habitat loss. This is no different for the species currently residing on Pennsylvania's threatened and endangered species lists, and for the mussel species proposed for listing.

**50. Comment: Did the PFBC staff consider habitat preferences for each mussel in their assessments? (Commenters 122, 123)**

**Response:** Yes. Habitat preferences for all five proposed species are generally similar. The exception is that the Salamander Mussel can usually be found beneath large, flat, shelter rocks, which is the preferred habitat for its host, the mudpuppy. The other four species all use fish host to complete their life cycle. All five species are generally dependent upon stable substrates consisting of sand, gravel, cobble substrates in rivers and streams. All five species reside in habitats that are threatened by various activities including activities that alter water quality, reduce habitat quality, or eliminate habitat altogether (e.g. sand and gravel mining).

## RESTORATION

**51. Comment: Why are there no restoration plans or strategies for the proposed species? Have propagation/reintroduction/augmentations of these species or strategies for identifying physical resources available for habitat management been considered? (Commenter 124)**

**Response:**

The PFBC prepares restoration or management plans after a species has become listed. A species is listed after existing mechanisms for protection and restoration have not been successful. Once listed, restoration or management plans take priority in an effort to enhance protection, conservation and enhancement of a species. For example, a comprehensive conservation management plan has been prepared for the Eastern Pearlshell (*Margaritifera margaritifera*), the only state listed mussel species. This document was prepared subsequent to the September 9, 2005 listing and identifies management strategies for the species. The ultimate goal of any restoration plan is to recover the species to the point where it can be delisted.

## ECONOMIC IMPACTS

**52. Comment: The proposal will severely affect the Commonwealth's ability to obtain PA Department of Transportation (PennDOT) quality aggregate in Western Pennsylvania within the next 12 to 18 months, where dredgeable locations are "dangerously low" with only three locations in the Allegheny River and four in the Ohio River where dredging is currently authorized for the 2009 construction season. (Commenters 10, 13, 30, 129, 130, 141, 142)**

**Response:**

There is nothing inherent in the proposed listings that will affect the Commonwealth's ability to obtain PennDOT quality aggregate in Western Pennsylvania. A review of PennDOT's Bulletin 14, which lists aggregate producers that have demonstrated their capability to produce material meeting PennDOT's specification requirements for the type and source listed, shows a number of aggregate producers throughout the state, including Western Pennsylvania, that provide PennDOT grade materials. The PFBC acknowledges that the listing of the five new mussel species may close some areas of the Allegheny and Ohio Rivers to dredging; however, the PFBC strongly disagrees with any assertion that the listings will entirely close or dramatically reduce the areas of the rivers that will be open to sand and gravel dredging. This assumption is simply not supported by the facts. As noted by a December 31, 2008, letter from the USFWS to the PFBC supporting these proposed listings, four of the five species proposed for listing (the Sheepnose, Rabbitsfoot, Snuffbox and Rayed Bean mussels) are typically co-located with the Northern Riffleshell and Clubshell mussels, both of which are already federally and state listed endangered species. Thus, such locations would typically be unavailable for dredging regardless of the PFBC's proposed action.

Given the relative rarity of these mussels and their potential for co-location with already listed mussels, the proposed rulemaking will not severely affect the Commonwealth's ability to receive PennDOT quality aggregate.

According to the most recent permit amendments issued to the companies currently producing river aggregate, pre-dredging mussel surveys have been completed and cleared, and the companies are authorized to dredge in the following locations: Ohio River, Montgomery Pool--River Miles (RM) 19.2 to 20.2 (Right Descending Bank --"R"); RM 20.6 to 21.6 (R); RM 21.0 to 21.7 (Left Descending Bank--"L"); RM 26.2 to 27.2 (L&R); RM 31.0 to 31.4 (R); Ohio River, New Cumberland Pool--RM 35.5-36.0 (L&R); Allegheny River, Pool 4--RM 26.4 to 26.7 (L); Allegheny River, Pool 5--RM 30.7 to 31.25 (L&R); RM 31.65-31.7 (L&R); Allegheny River, Pool 8--RM 54.7 to 55.2 (L&R). In addition, PFBC staff have recently reviewed pre-dredging mussel surveys for RM 48.8-49.3 in Pool 7 of the Allegheny River (dated October 2008) and RM 19.2-20.2 (L) in the Montgomery Pool of the Ohio River (dated November 2008), and neither of those surveys located any of the five species proposed for listing by this rulemaking.

The speculative statement of severe impacts on dredging runs counter to the significant evidence that the dredgers will not be forced off the river in the next 12 to 18 months. The PFBC would expect the dredgers to conduct further mussel surveys (which can be conducted on a mile or more of river per survey at a time) during the next 12 to 18 months in order to allow additional areas to be considered for dredging. Further, even if one of the proposed species is found (like the recent location of the Salamander mussel in Pool 5), the entire area sought to be authorized by the dredgers may not be restricted, allowing dredging operations to continue. Based on past pre-dredging survey results, the indirect impacts from the proposed listing on the dredging industry will be small and infrequent. Under a more likely scenario, nothing in the proposed rulemaking will force the dredgers to cease operations.

**53. Comment: The listing of the five mussel species will result in a potential additional cost to PennDOT of \$5 to \$6 million annually. (Commenter 83, 86)**

**Response:**

This comment is premised on the assumption that the cost of aggregate will increase by 30% to \$10.40 per ton. Thus, the PFBC has back calculated the current cost to be about \$8.00 per ton and the resultant cost increase would be \$2.40 per ton. Based on the PennDOT estimated total cost increase of \$5-\$6 million (divide 5,000,000 by 2.4 resulting in 2.08 million), it seems that PennDOT has assumed that the listing will result in the complete loss of the 2.1 million tons of aggregate annually that is supplied from

river-based sources. Thus, it seems that PennDOT has asserted that the river will be completely unavailable as a source of aggregate since 2.1 million tons is the total annual extraction. There appears to be no basis for this assertion since, as recently as January, permits were authorized for additional dredging. Furthermore, there are no studies that document the presence of the species continuously throughout the river system. The proposed endangered or threatened mussels and their protective buffers would have to completely cover the entire potential aggregate dredge areas of the Allegheny and Ohio Rivers in order to have the impact that PennDOT projects.

**54. Comment: If we lose the sand and gravel industry, we will lose the locks and dams. Sand and gravel make up a good percentage of the barge traffic using (and providing justification for) the locks and dams. (Commenters 125, 131, 140)**

**Response:**

The PFBC acknowledges this comment. However, we disagree with this conclusion as it implies the elimination or a severe reduction in dredging as a result of the proposed listings. See the response to Comment #52 above. Moreover, data regarding the current traffic in the lock and dam system indicates that there is significant lock and dam traffic beyond commercial use relating to the dredging industry. This data is available from the Port of Pittsburgh Commission (<http://www.port.pittsburgh.pa.us/home/index.asp?page=94>). The number of recreational and commercial tows for the Allegheny River Locks annually from 2000-2005 are as follows: Allegheny L&D 2 (6,150 recreational vessels, 1,275 commercial tows); L&D 3 (2,390 recreational vessels, 1,230 commercial tows), L/D 4 (2,180 recreational vessels, 1,333 commercial tows), L/D 5 (1,650 recreational vessels, 650 commercial tows), L/D 6 (1,050 recreational vessels, 140 commercial tows), L/D 7 (1,260 recreational vessels, 130 commercial tows), L/D 8 (760 recreational vessels, 725 commercial tows), L/D 9 (800 recreational vessels, 12 commercial vessels but no commercial cargo has passed in the past six years). Many commercial commodities other than aggregate are passed through all the locks, including coal, petroleum, chemicals, crude materials, farm products, manufactured machinery and manufactured goods. Coal is the primary commodity passed through Locks 2 and 3, while stone, sand, gravel, and cement are the principal commodities at Locks 4, 5, 6, 7 and 8.

**55. Comment: The proposal will have negative economic impacts or negatively impact dredging jobs. (Commenters 10, 13, 105, 111, 112, 115, 117, 118, 119, 120, 126, 130, 132, 135, 137, 138, 142, 144)**

**Response:**

As noted above, negative economic impacts are based on an erroneous assumption that the proposal will completely or substantially eliminate the extraction of aggregate from the Allegheny and Ohio Rivers.

**56. Comment: The PFBC's notice of proposed rulemaking does not accurately describe the fiscal impacts of the proposal on the Commonwealth or its political subdivisions and the new costs that it will impose on the private sector or the general public. (Commenters 13, 83, 134).**

**Response:**

The PFBC's past practice when describing the fiscal impacts associated with its rulemaking has been to examine the impacts that directly stem from that rulemaking as opposed to the indirect effects resulting from another agency's application of its authorities (e.g., DEP through the issuance of a permit). With regard to the mussel listings, the fiscal impacts that may be borne by the Commonwealth, the private

sector or the general public do not directly arise from the PFBC's listing decisions but rather from the application by agencies, such as DEP, of statutes and regulations that provide protection to threatened and endangered species. The PFBC's notice of proposed rulemaking did not purport to include the indirect impacts stemming from DEP's application of its authorities. The direct regulatory significance of the PFBC's designating a species as an endangered or threatened species is limited to prohibiting persons from taking, catching, killing or possessing these species in the Commonwealth. Because none of the mussel species proposed for listing have any commercial or recreational significance, there are no direct fiscal impacts from providing these protections. Moreover, the presence or absence of economic impacts does not change whether a particular species should be identified as endangered or threatened. This is based on scientific judgment after consideration of the best available information. Economic impacts may change the regulatory response to such a designation, but that is a question for agencies other than the PFBC.

**57. Comment: Because at least two of the species proposed for listing (the Salamander Mussel and the Rayed Bean) have already been found in portions of the Allegheny River (indicating they are more abundant than suggested in the notice), the likelihood that additional areas will become off-limits to future dredging is high, particularly in the Allegheny River. Thus, it is entirely possible that by the end of 2009 there will be no new areas available for dredging during 2010 because no "clean" mussel surveys will be obtained. (Commenters 13, 30)**

**Response:**

Mussels tend to be distributed in patches. Some mussels may be widespread, occur in high densities and therefore are more abundant. Other mussels, such as Rayed Bean, may be widely distributed, occur in low densities and therefore are less abundant. The PFBC has recently received two mussel surveys from the sand and gravel dredgers showing no detection of the Rayed Bean, Salamander, Sheepnose, Snuffbox or Rabbitsfoot.

**58. Comment: While some interests may argue that the listing of these species will cause severe economic impacts due to the restriction of natural resources, such as river aggregates, an analysis of the occurrence records of these species clearly shows that this is not the case. Except for a very few areas, the listing of these species will not greatly increase the amount of navigable river currently protected by already existing state endangered species regulations, noise code, the US Coast Guard /Corps restrictions and city ordinances. (Commenter 85)**

**Response:**

The PFBC acknowledges this comment.

**59. Comment: If protecting the mussels means PennDOT has to pay \$6 million more for their river aggregates (and it is not clear that that will in fact be the case) that is a small price to pay. (Commenter # 97)**

**Response:**

The PFBC acknowledges this comment. See response to Comment #53.

**60. Comment: If the riverbeds are publicly owned, I'd like it better if no companies ruined my public riverbed. Companies should not be allowed to dredge public riverbeds for their personal profit. (Commenters 109, 110)**

**Response:**

The PFBC acknowledges this comment.

ENVIRONMENTAL REVIEWS

**61. Comment: Pursuant to the PNDI review process the applicant for a permit must submit an accurate description of the location where its proposed activity will occur for review by an appropriate entity. If, as a result of the PNDI review, it is determined that a state "threatened" or "endangered" species is, or was at some point believed to have been, present within the described area, the applicant must either submit to costly and time consuming studies designed to "disprove" the presence of the species or withdraw the application, foregoing future operations. (Commenter 13)**

**Response:**

A Pennsylvania Natural Diversity Inventory (PNDI) review is required when an applicant is encroaching in a Pennsylvania waterway or wetland (DEP policy as associated with Chapter 105 regulations). The PNDI system houses the species of concern in the Commonwealth and, as a free tool to project applicants, is used to screen projects to make sure that rare species of the Commonwealth are not adversely impacted by a proposed permitting action. It is the responsibility of the jurisdictional agencies (DCNR-plants, PGC-birds, mammals, PFBC-fish, amphibians and reptiles, aquatic invertebrates, USFWS-federally listed plants and animals) to protect these Commonwealth resources and therefore resolve conflicts that occur between rare species and potential permitted actions. Given that these species are Commonwealth resources, it is incumbent upon the applicant to demonstrate to the resource protection agency that the species will not be impacted by the permitted action.

The PFBC responds to >3,500 projects per year with PNDI conflicts regarding species of concern. The vast majority of these conflicts are resolved quickly without the need for any study, habitat assessment or survey to be conducted (~85%). Others require habitat assessments and surveys to determine if the species or their habitat is present. While the vast majority of the consultations avoid and minimize impacts to species of concern, a small fraction of projects cannot avoid impacts. The PFBC strives to resolve permitting conflicts using principles of avoidance, minimization, and mitigation and uses a balanced approach.

**62. Comment: Will the PFBC be able to administer the increased number of PNDI hits that will result from listing these additional species in a timely manner? (Commenter 73))**

**Response:**

These species are currently tracked in PNDI and have been generating hits. Thus, the PFBC does not believe that additional PNDI environmental review effort will be needed, except possibly to resolve conflicts.

**63. Comment: In evaluating the impact of the proposed listings on the environmental review and permitting processes required to bring a transportation project to letting, PennDOT determined that these species predominantly overlap the distribution of the two currently**

**federally listed animals, the Northern Riffleshell and Clubshell mussels. Additionally, PennDOT's assessment regarding the physical boundaries of impact is such that these species would have limited occurrences within the surveys. This overlap in distribution and the limited occurrences results in an anticipated insignificant level of impact on letting bridge projects from an environmental review process. Mussel species already would be required in these waters as a result of the federally listed species, and PennDOT would expect that one of the species will be rarely encountered. US Fish and Wildlife Service provided a similar assessment. (Commenters 12, 83)**

**Response:**

The PFBC agrees with this comment.

**64. Comment: Significant portions of a number of Western Pennsylvania counties will become potentially "off-limits" to land based industrial activities, unless the permit applicant can (or is willing to) "document" that a species proposed for listing is actually not present in a nearby stream or otherwise will not be potentially affected by the proposed activity. (Commenters 13, 130)**

**Response:**

This presumption is incorrect. Areas of impact are generally confined to the waterbodies and associated riparian areas for the mussel species in question.

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2. Lamison, Helen
3. Welte, Carla
4. Welte, Mary
5. Zema, Jodi
6. Smith, Debbie
7. Smith, Eric
8. Vaghari, Sarah
9. Templin, Ezekiel
10. Wagner, Jason, Associated Pennsylvania Constructors
11. Graham, Lauren
12. Densmore, David, and Robert Anderson, U.S. Department of the Interior, Fish and Wildlife Service
13. Percha, Allan, Allegheny & Ohio River Sand & Gravel Dredgers
14. Winters, Dennis
15. Skripek, Val

16. Underwood, Todd
17. Besz, Jennifer
18. Ruhe, Brandon
19. Rocco, Gian
20. Leitkam, Stephen
21. Judge, Joseph
22. Jeffers, Mathew
23. Hassinger, Jerry
24. Shaw, Julie
25. Croushore, Amy
26. Henshue, Nicholas
27. Fortuna, Deborah
28. Ahlstedt, Steven, Freshwater Mollusk Conservation Society
29. Pearce, Tim
30. Vlahos, Peter, PA Aggregates and Concrete Association
31. Walsh, Mary, PA Biological Survey - Mollusk Technical Advisory Committee
32. Kasserman, Krissy, Mountain Watershed Association
33. Lang, Gerald
34. Chitester, Stefanie
35. Framel, Phyllis
36. Long, Anthony
37. Silknetter, Daniel
38. McGregor, Aaron
39. Thoma, Linda
40. Brezin, Amy
41. VanValkenburgh, Claire
42. Muntzel, Philip
43. Faulds, Ann, Penn State University's Sea Grant Program
44. Shaw, Renee
45. Koval, Richard, North Branch Land Trust
46. Croushore, Lara
47. Fowler, Heather
48. Welte, Teresa
49. O'Donnell, Frank & Marion
50. Robb, Paul
51. Ellis, George, and Susan Germanio, PA Coal Association
52. Croushore, Edward
53. Vogt, James and Carolyn Lange
54. Hollingsworth-Segedy, Lisa, American Rivers
55. Post, Thomas
56. Smith, Lisa
57. Kotala, Stan, The Moshannon Group of the Sierra Club
58. Wentz, Terry, Juniata Valley Audubon
59. Sinclair, Sandy
60. Gipe, Katharine
61. Welte, Sara
62. Rohrbach, Saura
63. Woodwell, Davitt, The PA Environmental Council
64. Fiegel, Byron
65. Harper, Jesse

66. Ruhe, Maureen
67. Dally, Lisa, Wildlands Conservancy
68. Bauer, Denise
69. Sacchi, Christopher
70. Smith, Tamara
71. Bogan, Arthur
72. Anderson, Wesley
73. D'Amico, Lou, and Greg Styborski, The Marcellus Shale Committee, the Independent Oil and Gas Association of PA, and the PA Oil and Gas Association
74. Johnson, Nels, The Nature Conservancy
75. Drasher, James
76. Whidden, Howard
77. Ciamacco, Joanne
78. Urbanski, Marce
79. Buchanin, Dennis
80. Anderson, Bill, The Little Juniata River Association
81. Ranson, Constance
82. Reichard, Tim
83. Thompson, Brian, PA Department of Transportation
84. Donlan, Ron, Sustainable Environmental and Economic Partnership
85. Zimmerman, Gregory
86. Stout, Barry, Senate of Pennsylvania
87. Winters, Robert
88. Hove, Mark
89. Campbell, David
90. Schueler, Frederick
91. Krcil, Chet
92. McCoy, Elisabeth
93. Bench, James
94. Gleason, William
95. James, Robert
96. Wilkinson, Susan
97. Ulmer, Stephanie
98. Platt, Joel
99. Sarah, Rasmus
100. Brewer, Ben
101. Joyce, Edward
102. Kimmel, William
103. Scott, Dave
104. Milliron, Eric
105. Schaeffer, Danny
106. Caruso, Jim
107. Beuth, Dirk
108. Beuth, Melanie
109. Balko, Terrie
110. Merlino, John
111. Jack, Lloyd
112. Kovatch, Dolores
113. Kedzierski, Wendy
114. Tautin, John, The French Creek Valley Conservancy

115. Toy, Rodney
116. Zawoyski, Michael
117. Toy, Tami
118. Cannon, William
119. Miller, Jeff
120. Kerr, Krystal
121. Koral, Marian
122. Diamond, Jerry, Ph.D., Tetra Tech, Inc.
123. Miller, Andrew, Ecological Applications
124. Proch, Thomas
125. McCarville, James, Port of Pittsburgh Commission
126. Frantz, Kelly
127. Borsuk, Frank, Ph.D., U.S. Environmental Protection Agency
128. Maranche, Mike, Allegheny County Sportsmen's League, Inc.
129. White, Don, Pennsylvania Senate
130. Pyle, Jeff, Pennsylvania House of Representatives
131. Scahill, James, County Commissioner, Armstrong County
132. Snyder, Mark, Glacial Sand and Gravel Company
133. Davis, Kathy
134. Kurpiel, Ronald, Hanson Aggregates
135. Bevalaqua, Curt, Laborers Local 1058
136. Bryan, Tom, Tri-State River Products, Inc.
137. Minton, Charles, Campbell Transportation
138. Stephaich, Peter, National Waterways Foundation
139. Spozio, Bernie, Pennsylvania Federation of Sportsmen's Club
140. Devinney, Mark, Freeport Terminals
141. Volz, Conrad, Ph.D., Center for Healthy Environments & Communities
142. Barcaskey, Richard, Constructors Association of Western Pennsylvania
143. Rawlins, John, Carnegie Museum of Natural History
144. Glacial Sand and Gravel Employee Form Letter (30 employees)
145. Zerbe, Faith, Delaware River Network

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