

Responses to Questions relating to the Proposed Rulemaking on Mussel Species
Western Pa Commercial Sand and Gravel Industry

1. How was the Listing Criteria document developed?

In 2004, the PFBC charged the Pennsylvania Biological Survey (PABS) with the development of objective 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. Each technical committee of PABS is made up of volunteer taxonomic experts recognized in their field. The then President of PABS, Jerry Hassinger, obtained a Wild Resource Conservation Fund grant to investigate listing processes across all taxa (fish, mammals, birds, reptiles and amphibians, invertebrates). Through this research, it was found that the International Union of Conservation of Nature (IUCN) red book method (version 3.1, adopted by IUCN in 2001) was an accepted objective method for listing decisions. The IUCN is the world's oldest and largest global environmental network with more than 1,000 government and NGO member organizations and almost 11,000 volunteer scientists in more than 160 countries. It supports scientific research, manages field projects all over the world and brings governments, non-government organizations, United Nations agencies, companies and local communities together to develop and implement policy, laws and best practices with respect to protecting vulnerable species. The results of the Hassinger study were presented to the Technical Committees of PABS. After the Committees reviewed the method, it received general support after taxonomic specific modifications were made. PFBC staff worked with representatives from each of the Technical Committees to further refine the objective criteria for each taxonomic group. The Fishes Technical Committee (FTC) was the first to complete the petition process and objective criteria (modified IUCN). PFBC staff accepted the criteria. Shortly thereafter, the FTC submitted to the PFBC a fish de-listing package using the new listing criteria. Working in parallel with the FTC, the Bivalve Committee (which is responsible for fresh water mussels) further refined its listing method.

2. What changes did the F&BC do to tailor the criteria from that proposed by the IUCN Red List?

PFBC staff added the petition and documentation process, which is not in the IUCN method. PFBC staff accepted modifications to this method proposed by the study discussed in the response to question #1 above. Specifically for mussels, criterion B4, Sum of Proportions of Watersheds Occupied, was investigated by the Bivalve Subcommittee but ultimately removed from the criteria due to the lack of a statewide reference species that is needed to make the criteria work. With respect to the criteria regarding population decline, PFBC staff focused on the decline of metapopulations and/or subpopulations rather than on the decline of individual species across all meta- and subpopulations.

3. What other agencies and/or organizations use a similar criteria?

The IUCN red list is a widely recognized method for listing and evaluating threatened and endangered species by conservation organizations, other countries and individual states within the United States. While the PFBC has not specifically researched the use of the IUCN red list methodology by other entities, the PFBC is aware that both Florida and Massachusetts employ listing criteria based on a modified IUCN method.

4. How was it determined to base a "site" on 12 digit HUC units?

a. What was the rationale behind this?

The premise of this question is inaccurate. "Sites" are generally defined as the point locations where live, fresh dead, or relic specimens of a particular species have been collected. The definition of "site" should not be construed to mean "population." A "population" may consist of multiple streams that allow for species dispersal and gene flow. A site is not based on a HUC unit; however, twelve-digit HUC units were used to examine trends, when applicable. A HUC 12 subwatershed is approximately 15-60 square miles. For example, a species may occupy 20 "sites" throughout the Ohio River Basin but may only be found in three HUC 12 subwatersheds.

- 5. Many (maybe even most) of the criteria for listing appear to be based on perceived threats to these particular mussel species.**
- a. How were threats identified and quantified for each mussel species proposed for listing? Provide the analysis utilized.**
 - b. Do the types of threats differ between the species proposed? If so, how do they differ?**
 - c. Do the types of threats differ between the species proposed for listing, and species not proposed for listing? If so, how do they differ?**

As part of the documentation process, which PFBC staff already provided to representatives from the dredging industry, a threat assessment was conducted for each species on a watershed basis. 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 to areas occupied from these species, including but not limited to existing permitted activities, basin bathymetry, and physical observation. The status change/documentation form provided the threats analysis. Threats to the proposed species were generally the same for species whose ranges overlapped. (See notice of proposed rulemaking and Status Change/Documentation Form for more detailed threat assessments for the proposed species). The activities noted would threaten any freshwater mussel species. The individual threats noted in the documentation forms and in the notice of proposed rulemaking catalogue the threats based on watershed location. Individual species also differed in threats to host species. In addition, the individual threats to each species were presented and discussed in the December 11, 2008 meeting between PFBC biologists and representatives of the dredgers. 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.

- 6. In the Status Change Form, dredging is perceived as an uncontrollable threat to state-listed species. However, pre-dredging mussel surveys must be conducted, in order to prevent impacts on listed mussel species, by avoidance of the area harboring the species.**
- a. Why is dredging perceived as an uncontrollable threat?**
 - b. Is avoidance the best means of mitigating potential adverse impacts?**
 - c. Why are pre-dredging mussel surveys not discussed in the Status Change Form?**

The threats posed to freshwater mussels by dredging activity are well documented in the scientific literature. 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, as noted in the Smith report, which PFBC staff previously provided to the dredgers' representatives. Avoidance is the best means of mitigating potential adverse impacts to freshwater mussels, given that they are sessile organisms (i.e., mussels are relatively immobile). Data from pre-dredging mussel surveys were considered as a part of a

larger dataset in both the documentation and consideration of the proposed listing. Indeed, the recent data collected by Aquatic Systems in its pre-dredging survey (Pool 5 – August 2008) were added to the status review.

- 7. According to the range map prepared by the Commission, the Salamander Mussel was rarely reported anywhere in PA and, based on the national map, appears to be on the fringe of its historical range.**
 - a. How is this taken into account in determining population reductions or distribution and trend analysis? Provide the analysis that was utilized.**
 - b. For the Salamander Mussel, the federal status of this mussel in “None.” It is not even considered a federally proposed candidate species. How was this taken into account by the Commission in its proposed listing?**

The salamander mussel’s range includes the Canadian province of Ontario and the Great Lakes north of Pennsylvania and the Mississippi River Basin south of Pennsylvania. (See notice of proposed rulemaking and PABS Status Change / Documentation Form for additional range information). Pennsylvania is now the northernmost state in the salamander mussel’s Mississippi River Basin range; however, this is because the salamander mussel is believed to be extirpated from the state of New York (as shown on the NatureServe 2008 map previously provided to the dredgers’ representatives). Extirpated means completely removed from an area, but because the species exists elsewhere, it is not considered extinct. The PFBC considered only state rarity and Pennsylvania threats in its assessment and ranking the salamander mussel as endangered. Federal actions are separate from state action, but any federal assessment of species proposed for state listing further illustrates the state of the species throughout its range. The salamander mussel has a state rank (S1) Critically Imperiled and is globally considered Vulnerable (G3). The United States Fish and Wildlife Service (USFWS) describes the salamander mussel as a Species of Concern. Presently, a federal status assessment is being prepared for the salamander mussel.

- 8. The Status Change Form and other published reports identify the change in river habitat due to the locks and dams as a primary factor causing the apparent rarity of the proposed mussel species in the navigable Allegheny and Ohio Rivers.**
 - a. Why is this factor not considered a current and future threat to the proposed mussel species?**
 - b. If it is identified as a threat, how is this used in categorizing the listed mussel species?**
 - c. How will recovery of these species be ensured with the continued presence of the lock and dam system?**

The threat assessments for salamander mussel 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. The threat of genetic isolation due to impoundments is addressed in the Status Change / Documentation Form provided by PFBC staff to industry representatives. With the continued presence of the lock and dam system, the first step to recovery is to list these species as endangered, so all future permitting from the Department of Environmental Protection 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 proposed to de-list 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.

- 9. In the Listing Criteria, it states that the relevant factor is whether any one criterion is met. In Criteria B.5.b., it states that continuing decline “observed, inferred or projected.” This is such a wide range**

from observed to inferred, that a case could be made that almost anything would meet this criteria as “inferred or projected.”

a. Explain this criteria and specifically how it relates to the Salamander Mussel.

The “observed, inferred or projected” language is derived from the IUCN Red List. This is, in part, a recognition that there will be some level of uncertainty of historical population levels. This criterion is tempered by both the use of current data and expert judgment. In the case of the salamander mussel, the paucity of documented occurrences in Pennsylvania heightens its vulnerability to extirpation in any portion of its already severely limited range. The PFBC relies on the status change/documentation process to qualify this criterion and also relies on the biological expertise of its staff and the members of PABS to review, modify and validate the status change/documentation assessment.

10. Who prepared the Status Change Form for the Salamander Mussel? Provide their names and association.

The status change/documentation form for the salamander mussel was prepared on behalf of the PABS Bivalve Subcommittee by Nevin Welte. The Subcommittee reviewed, discussed, modified, and contributed data to this status change form. The Subcommittee subsequently voted unanimously to recommend to PFBC staff that the PFBC elevate the salamander mussel (*Simpsonaias ambigua* – Proposed Endangered). The following individuals were on the PABS Bivalve Subcommittee and involved in formulating the recommendation: Mary Walsh (Chair – Western Pennsylvania Conservancy (WPC)); Elizabeth Meyer (WPC); Tamara Smith (WPC); Nevin Welte (WPC); William Lellis (U.S. Geological Survey (USGS)); Rita Villella (USGS); Glenn Nelson (USGS); Greg Zimmerman (EnviroScience); Danielle Kreeger (Partnership for the Delaware Estuary); Darran Crabtree (The Nature Conservancy); Robert Anderson (USFWS); Tim Pearce (Invertebrate Committee Chair – Carnegie Museum of Natural History); and Chris Urban (PFBC). To the knowledge of PFBC staff, all subcommittee members are currently actively involved in Pennsylvania mussel research and have conducted mussel surveys in Pennsylvania.

11. Has F&BC defined habitat for the Salamander Mussel, specifically for PA? If so, provide an explanation of habitat for the Salamander Mussel.

The habitat for the salamander mussel is described in the status change/documentation form previously provided by PFBC staff to the dredgers.

12. Has F&BC developed a Recovery Plan for the Salamander Mussel, specifically for PA? If so, provide an explanation of the Recovery Plan for the Salamander Mussel.

No. The PFBC typically does not prepare recovery plans for species that are not listed as threatened or endangered.

13. What is the PA legal status of the Mudpuppy, which is the host for the Salamander Mussel?

a. Explain if the Mudpuppy’s legal status was taken into consideration by the F&BC, prior to the proposed rulemaking on the Salamander Mussel. If so, how was it considered?

The mudpuppy is currently a no-take species, which means that there is no open season and the creel and daily limit is zero. The status of the mudpuppy in the Allegheny River is unknown, and the uncertainty of its status was considered in the status change/documentation form. Pennsylvania currently lists the mudpuppy as S3 (Vulnerable) (NatureServe, 2008).

- 14. One of the criteria deemed to be appropriate for the Salamander Mussel is General Criteria A.2, which state “Population reduction of at least _____% projected or suspected to be met within the next ten years or 3 generations, whichever is longer, based on and specifying any of b), c), d) or e) above (in General Criteria A.1.)” For the Salamander Mussel, F&BC chose endangered (>80% in next 10Y or 3G).**
- a. Is this in the next 10 years or 3 generations? How was this determined? Based on what data?**
 - b. Was this projected or expected? How was this determined? Based on what data?**
 - c. What is the current value of the population of the Salamander Mussel in PA, utilized to base the percentage reduction on?**
 - d. What data was used to reach these findings? Provide the data utilized.**
 - e. What is a normal life expectancy of Salamander? How long is a Salamander generation?**
 - f. As per b), c), d) or e), which one(s) were utilized? Provide the justification or basis for this decision.**

The PFBC used 10 years for the population reduction criteria because not enough is known about the generation cycle of the salamander mussel in Pennsylvania. This decline was projected to be 80% decline within the next 10 years based upon the following analysis. The PFBC has documented four metapopulations of the salamander mussel. These four metapopulations are Dunkard Creek, French Creek, Allegheny River pool 5, and Allegheny River pool 6. Given their current state and threats, the Dunkard Creek, French Creek, and Allegheny River pool 5 metapopulations are projected to become extirpated within the next 10 years. The pool 6 metapopulation is threatened by genetic isolation, natural mortality and the threat of a pollution event. In total, this would achieve the 80% reduction. The population reduction is both projected and expected based on evidence of actual collections. PFBC staff previously provided the population range map for the salamander mussel to the dredgers. The data used to reach this finding was provided to the dredgers in the status change/documentation form. The PFBC does not have information on the life expectancy of salamander mussels in Pennsylvania. We assume question 14 f. pertains to which subcriteria were used under A1. Those were a, c, d, and e.

- 15. One of the criteria deemed to be appropriate for the Salamander mussel is General Criteria B.3., which states “Extent of occupancy is stream or river less than _____miles.” For the Salamander Mussel, F&BC chose endangered (<10 miles). The Status Change Form states that the Salamander Mussel is found in pools 5 and 6, and other areas.**
- a. Pool 5 and 6 combined are 15.3 miles, which is greater than 10 miles. Since the criteria for endangered has not been met, how is this criteria appropriate for proposed endangered status? Explain this determination.**
 - b. Provide the utilized extent of occupancy is streams or rivers that show it to be less than 10 miles.**
 - c. What does this criteria mean and how is it relevant to “endangered” status?**
 - d. What data was used to reach this finding? Provide the data utilized.**

Evidence of salamander mussels (represented by live, fresh dead or relic shells) have been found at 10 sites over a total of 5.8 stream miles (includes sites in Dunkard Creek, French Creek and Allegheny River Pools 5 and 6). The premise of the question assumes that because a salamander mussel is found in Pool 5, the entirety of Pool 5 is counted in the extent of occupancy. This assumption is in error. The estimate of stream miles represents contiguous habitat based on data of presence, information regarding habitat and best professional judgment. The evidence of salamander mussel occurrences in Pennsylvania have been collected by D. Stansbery (1970), A. Bogan (1993)/Welte (2008), G. Zimmerman (2007), C. Bier (1985, 1995), and T. Smith (2005, 2007), Bogan (2008). Extent of occupancy means evidence of salamander mussels as defined above. The extent of occupancy is relevant to listing as endangered or threatened because the lower the extent of occupancy of a species the greater the risk of extirpation due to threats, e.g., a pollution event, commercial sand and gravel dredging and, effects of acid mine drainage,

etc. The data used to reach this finding was provided to the dredgers in the status change/documentation form.

16. One of the criteria deemed to be appropriate for the Salamander Mussel is General Criteria B.4.a. Since there is no B.4., we will assume it should be General Criteria B.5.a., which states “Severely fragmented or known to exist at ____ locations(s). For the Salamander mussel, F&BC chose endangered (<6 locations).”

- a. **The Status Change Form states in Item 15, that the mussel was collected in seven sites in Pools 5 and 6, and two sites in Dunkard Creek, plus fresh dead in French Creek. These numbers of sites alone are more than 6 sites. Since the criteria for endangered has not been met. How is this criteria appropriate for proposed endangered status? Explain this determination.**
- b. **What data was used to reach this finding? Provide the data utilized.**

As noted in the response to question 2 above, criterion B.4., Sum of Proportions of Watersheds Occupied, was investigated by the PABS’ Bivalve Subcommittee and was ultimately removed from the criteria due to the lack of a statewide reference species that is needed to make the criteria work. PFBC staff therefore did not include this criterion in the listing criteria. However, when preparing the Status Change/Documentation form, they did not delete the references to it. Accordingly, there is a discrepancy between the two documents, which will be corrected. This question misapplies the IUCN methodology as this criterion is met for the salamander mussel. In determining severe fragmentation, location encompasses a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the taxon present. The salamander mussel is found in four geographically or ecologically distinct areas in Pennsylvania (this includes the fresh dead found in French Creek). The data used to reach this finding was provided to the dredgers in the status change/documentation form.

17. One of the criteria deemed to be appropriate for the Salamander Mussel is General Criteria B.4.b. Since there is no B.4., we will assume it should be General Criteria B.5.b., which states “Continuing decline, observed, inferred or proposed in any of the following:

1. **Extent of occupancy**
2. **Area of occupancy**
3. **Area, extent and/or quality of habitat**
4. **Number of locations of subpopulations**
5. **Number of mature individuals**
6. **Reproduction and recruitment of mature individuals into population.**

Also, the Notice of Proposed Rulemaking, Section E.1., states that the Salamander Mussel showed that a “continued, documented decline has occurred.” For the Salamander Mussel:

- a. **Which one(s) of (1) to (6) was chosen? Why were these chosen? Provide the data or justification for the chosen criteria.**
- b. **How did F&BC determine that in PA there was a “continuing decline?” Provide the records of the documented decline discussed in the Notice of Proposed Rulemaking.**
- c. **Provide proof of a “continuing decline” in PA. Provide the historically data utilized as a comparison to the current data to prove a continuing decline.**
- d. **Which term “observed, inferred or projected” was chosen? Provide the data or justification for choosing the term.**
- e. **The term “qualifying decline, any rate.” What does this term mean with respect to this criteria. Provide the data utilized to determine the “qualified decline” specifically to PA?**
- f. **What data was used to reach this finding? Provide the data utilized.**

The listed sub-criteria implicated in the decision to recommend the listing of the salamander mussel are B.5.b.3. through b.6. The data and justification for each was previously provided in the Status Change/Documentation form. The continuing decline was determined based on an examination of both

French and Dunkard Creek populations and the continued dredging in Pool 5 of the Allegheny River. The French Creek population is presumed extirpated. The Dunkard Creek population is considered reproductively non-viable, which will lead to eventual extirpation. Allegheny River pool 5 has been and will continue to be commercially dredged, which will cause a decline in area, extent and quality of habitat. The PFBC's conclusions are based on both observation and inference. A qualifying decline is a documented decline in accordance with best professional judgment. The data used to reach this finding was provided to the dredgers in the status change/documentation form.

- 18. In the Status Change Form for the Salamander Mussel, Item 10, states that there has been enough information collected from streams and rivers in PA to warrant the species be elevated from rare to endangered status.**
- a. Provide the information that has been collected to justify that “enough information has been collected.”**
 - b. Is there any more information than provided in item 15? If so, provide the data.**

The sentence cited in this question is from the summary of the status change/documentation form that effectively and concisely summarizes the information contained in the document. The current information represents years of survey work conducted by experienced mussel surveyors throughout the Ohio Basin of Pennsylvania. For example, since 2001, over 500 transects have been surveyed in the Allegheny and Ohio Rivers alone using recognized mussel survey protocols. Further, since 1996, the commercial sand and gravel dredgers themselves have surveyed over 49 miles of the Ohio Basin and have only found two live salamander mussels.

- 19. In the Status Change Form for the Salamander Mussel, Item 10, states that the PABS recommends that the species should be elevated to endangered.**
- a. Who conducted the peer review of this recommendation? If the peer review was conducted by F&BC staff, provide the names of the staff who conducted peer review.**
 - b. Was the peer review conducted by any entity other than the F&BC? If so, what other entity provided peer review?**

The members of the PABS Bivalve Subcommittee that made this recommendation are identified in the answer to question 10 above. The PFBC staff who reviewed and concurred with the PABS recommendation were Chris Urban, John Arway, Leroy Young, and Dr. Douglas J. Austen.

- 20. In the Status Change Form for the Salamander Mussel, Item 11, states that survey of French Creek did not detect the presence of the Salamander Mussel. Item 15 states that fresh dead Salamander Mussel shells were collected in French Creek.**
- a. Explain this discrepancy.**

There is no discrepancy. Item 11 states in its entirety that “the status of the French Creek population (one site, Venango County) is unknown. Shells were found in 1985 and 1995..., but no live individuals were detected. Surveys of French Creek and its tributaries did not detect the presence of the salamander mussel.” In the context of the entire item 11, the reference to salamander mussel was to live salamander mussels.

- 21. In the Status Change Form for the Salamander Mussel, Item 13, states that two records have been reported more than 25 years ago, while Item 15 states ten records have been collected in less than 25 years. From this, no inference can be made as to the population trend either increasing or decreasing. If any, the population is increasing, from two records to ten records.**
- a. Explain this discrepancy.**

b. Provide the proof that the population is indeed declining in PA.

The historical record for the salamander mussel is not robust enough to draw any scientific conclusions regarding decline based on the historical record. The documentation of the decline of the salamander mussel is based on recent survey records (i.e., records within the past 25 years). The responses to questions 15 and 17 above discuss the decline in salamander mussels.

22. In the Status Change Form for the Salamander Mussel, Items 14 and 16 indicate that there is no abundance data for the Salamander in PA. However, Item 16 states that there is a declining population in PA.

- a. Explain this discrepancy.
- b. Provide the proof that the population is indeed declining in PA.

Abundance data was not used in this analysis. This analysis was based on presence-absence data. See the answer to questions 17 and 21 above.

23. In the Status Change Form for the Salamander Mussel, Item 17, states that there is a declining population nationwide and within PA. A percentage reduction is provided nationally, however no percentage reduction is provided for PA.

- a. Why is this?
- b. Provide proof of the actual number of streams in PA historically that harbored the Salamander Mussel. Likewise, provide proof of the actual number of streams in PA currently that harbor the Salamander Mussel. In this way, a percentage stream reduction, if any can be calculated.

See answer to questions 17 and 21. A map showing the actual streams that currently and/or historically harbored salamander mussels was previously provided to representatives for the dredgers and was discussed at the December 11, 2008 meeting. To the degree that a percentage decline is enumerated, given the presumed extirpation of the French Creek population (finding of dead, but no live individuals), the percentage decline in Pennsylvania metapopulations of the salamander mussel as reflected in current data is 25%.

24. In the Status Change Form for the Salamander Mussel, Item 17, states that the reproductive status of the Salamander Mussel in PA is unknown.

- a. Why is this?

Studies have not been done to document the reproductive status of the salamander mussel in Pennsylvania. Observations and inference on the known locations in Pennsylvania indicate that the French Creek population is likely extirpated, and Dunkard Creek population is likely reproductively non-viable. Reproductive information for salamander mussels is not available for the Allegheny River pools 5 and 6.

25. In the Status Change Form for the Salamander mussel, Item 20, states that the habitat description for the Salamander mussel is occurring in sand or silt under large flat stones in swift current. Other literature indicates that the Salamander Mussel prefers vegetation and a weedy bottom.

- a. If this is indeed the habitat for the Salamander Mussel in PA, why is the Salamander Mussel currently found in Pool 5, which has been extensively dredged?
- b. Is the F&BC suggesting that extensively dredged pools in PA are indeed the habitat for the Salamander Mussel?

Pool 5 has not been entirely dredged. A recent review of bathymetry mapping of the location of the salamander mussel found by the dredging consultants shows that the depth is between 12-22 feet, which is likely an undredged portion of the pool. The PFBC is not suggesting that extensively dredged areas in Allegheny River pool 5 are habitat for the salamander mussel. Indeed, the scientific literature shows that extensively dredged areas are particularly unsuitable habitat for mussel species, as noted in the answer to question 6 above.

26. In the Status Change Form for the Salamander mussel, Item 22, states that because of the impending dredging in the Allegheny River, any remaining habitat for the Salamander Mussel may be eliminated in the “short term.”

- a. **Provide proof and the justification for this statement.**
- b. **How long, in terms of years, is the “short term” that the F&BC references?**

The PFBC generally relies on the bathymetry data available for the Allegheny River as well as presence data from surveys of Pool 5. Although the documentation form does not define short term, the PFBC has interpreted the term to mean less than 10 years. The current remaining term of the dredgers' Water Obstruction and Encroachment Permit in pool 5 is two to three years. Without the protection provided by an endangered or threatened status, the remaining salamander mussel habitat in pool 5 would be reduced or eliminated in the short term.

27. In the Status Change Form for the Salamander mussel, Items 21 and 23, states that commercial sand and gravel dredging account for habitat loss for the Salamander mussel.

- a. **Commercial sand and gravel dredging occurs in deep water in slow currents. How can currently permitted dredging account for habitat loss for the Salamander Mussel when the area being dredged is not the habitat?**

While the Allegheny River was once a free-flowing, ecologically functional river, navigational locks and dams, maintenance of channels, and commercial sand and gravel dredging in the river have altered the natural depth and flow regime. Undredged areas of the river bottom represent remnant habitat and mussel populations that have not been altered/destroyed by dredging activities. As noted in the 2008 Smith Report provided to industry representatives, mussels were found in the Allegheny River at depths of up to 9.8 meters (32.15 feet), although 95% of all mussels found were found in depths of up to 6 meters (19.7 feet). These are areas of habitat that could be dredged, which would lead to loss of habitat directly due to commercial sand and gravel dredging. A more comprehensive answer to this question is contained in the previously provided Smith Report. An excerpt from that report follows:

In addition to dams, sand and gravel mining for commercial and channel maintenance drastically alters the river substrate and flow which can result in reduced or elimination of mussel populations (Brown *et al.* 1998, Hubbs *et al.* 2003, Meador and Layher 1998). Dredging permanently removes sand and gravel substrate, which is essential habitat to mussels and fish. Deep holes left from dredging operations often fill with silt and debris unsuitable for mussel colonization since the natural migration of sand and gravel from upstream is impeded by further impoundments. These deep portions of the river may not be subjected to any water currents and therefore have depleted dissolved oxygen levels. Documented dredging impacts include the reduction of biofilm, reduced fish species richness and shifts in the invertebrate community (Brown *et al.* 1998, Porto *et al.* 1999). The taking of sand and gravel from the river bottom also adversely affects downstream benthic invertebrates and fishes. Transport of suspended sediments from excavation activities has led to the loss or reduction of fish and macroinvertebrate spawning, rearing, and foraging habitat (Cross *et al.* 1982). In addition, river islands and shoals are also

affected by dredging due to increased erosion from altered flow regimes in close proximity to islands (Hartfield 1997, Vaughn and Taylor 1999).

...

Our depth and substrate analyses indicate that species richness, total abundances, riverine species abundance, and facultative species abundances were all negatively affected by increased depths and increased amounts of silt and organic debris. The highest mussel species richness, total abundances, species abundance values were the found in relatively shallow depths with high percentages of sand, gravel and boulders. It is imperative that areas with depths less than 6 to 9 meters with gravel, sandy, and/or boulder substrate are protected from future dredging. Resource managers should consider defining specific contour setbacks that protect river depths with the greatest likelihood of containing mussel populations.

...

Although the highest overall species diversity was recorded in pool 6, this pool has had a moratorium on dredging operations since December of 1985, which may account for the relatively high abundance and species diversity documented in this pool. Additionally, a large number of transects were surveyed within this pool, thereby increasing our chances of detecting rare species. Since the 1985 moratorium, abundance and species richness in pool 6 are similar to the upper portion of pool 8 where no dredging has occurred. This comparison presents strong evidence that the alteration and loss of habitat due to sand and gravel dredging activities has had a severe effect on the freshwater mussel fauna of the pools. The protection of any relatively shallow sand and gravel habitats that have not yet impacted by dredging operations is most important to sustain any remaining freshwater mussel populations in these areas. In addition, the affects of nearby dredging on non-dredged areas should be examined, to determine necessary buffers that should be implemented to further protect mussel and fish habitat.

28. In the Status Change Form for the Salamander Mussel, Item 25, states that enough information is available to conclude that the mussel is endangered in PA; however additional surveys should be conducted to determine extent beyond Pool 5 & 6.

a. These contradictory statements seems to support the notion that F&BC does not currently have enough information to definitively make the status designation above rare. Explain this contradiction.

As with all of its jurisdictional species, the PFBC will continue to assess existing populations and potential range expansions and seek further data. It should be noted that the surveys conducted by T. Smith and E. Meyer were considered by PABS in its recommendation and by the PFBC in the listing decision. Those surveys included Pools 4, 5, 6, 7 and 8 of the Allegheny River. Salamander mussels were only found in Pools 5 and 6. The PFBC also has access to the extensive pre-dredging mussel surveys submitted by the dredgers. Given the survey effort in the historic range of the salamander mussel in Pennsylvania, the PFBC is satisfied that the salamander mussel meets the criteria for endangered status.

29. In the Status Change Form for the Salamander mussel, Item 26, states that sand and gravel dredging operations in Allegheny River Pool 5 should cease immediately.

a. Provide the names of the F&BC staff who made this statement?
b. Is this the official opinion of the F&BC?

The PABS Bivalve Subcommittee petitioned the salamander mussel for potential listing. The status change/documentation form for the salamander mussel, which included the recommendation to cease

dredging in pool 5 of the Allegheny River, was written, reviewed, edited and discussed among the PABS Bivalve Subcommittee. The listing petition, which included the recommendation to cease dredging in pool 5, was voted on by the Bivalve Subcommittee and was forwarded to the PFBC's staff for consideration. The PFBC's staff concurred with the Bivalve Subcommittee's recommendation for listing and subsequently recommended to its Board of Commissioners that it approve the publication of a notice of proposed rulemaking containing the proposed listing. The Board of Commissioners accepted staff's recommendation, and as you know, a notice of proposed rulemaking was published in the *Pennsylvania Bulletin* on December 6th. The PFBC has never adopted a position that a dredging moratorium be imposed on Pool 5, although it does support the current moratorium on dredging in Pool 6. The PFBC did request that dredging not be authorized in specific portions of pool 5 in order to protect the salamander mussels found by the dredging consultants. As recently as November 2008, the PFBC's staff have offered to work proactively with the dredgers to identify areas in the Allegheny and Ohio Rivers that could be dredged. As recently as last year, the PFBC's staff "cleared" nearly one mile of river to be dredged in Pool 4 based on pre-dredging mussel and fish surveys between River Miles 27.8 and 28.5. The approval to dredge these areas was recently rescinded about a year after they were approved at the request of the dredgers, not at the request of the PFBC or any other resource agency.

- 30. In the Notice of Public Rulemaking, Section G – Fiscal Impact, states that the proposed rulemaking will have no adverse fiscal impact on the Commonwealth or its political subdivisions. The proposed rulemaking will impose no new costs on the private sector or the general public.**
- a. What type of socio-economic analysis was utilized to determine that there will be no fiscal impacts?**
 - b. Provide the socio-economic analysis utilized to determine that there will be no fiscal impacts?**

The fiscal impacts that may be borne by the private sector or the general public do not directly arise from the PFBC's listing decision but rather from the application by agencies, such as the Department of Environmental Protection, of statutes and regulations that provide protection to threatened and endangered species. The direct regulatory significance of 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. Since none of the mussel species proposed for listing have any commercial or recreational significance because of their rarity, there are no direct fiscal impacts from providing these protections. To the degree the dredging industry asserts that the designation of these species as endangered or threatened may have indirect fiscal impacts to them because of the impacts on permitting decisions by the Department of Environmental Protection and other agencies, these fiscal impacts result from regulatory and statutory authorities under the aegis of agencies other than the PFBC. Typically, if an endangered or threatened species is found in an area slated for development, applicants for permits may be required to conduct additional studies or adjust their projects to avoid adverse impacts to the species and its habitat. In this case, the dredging industry is already conducting pre-dredging mussel surveys due to both federally and state listed endangered and threatened mussel species. 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. The PFBC's responsibility is to identify these species and to regulate their taking, catching or killing from Pennsylvania's waters.