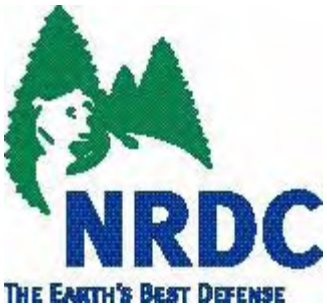


VIA EMAIL AND CERTIFIED MAIL

March 14, 2007

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Re: Endangered Species Act section 7(a)(2) informal consultation regarding the effects of atrazine on eight listed species.

Pursuant to ¶ 12 of the Settlement Agreement in *Natural Resources Defense Council v. EPA*, No. 03-cv-02444-RDB (D.Md.), attached are NRDC's comments on EPA's effects determinations for the following eight species: pink mucket pearly mussel, rough pigtoe mussel, shiny pigtoe pearly mussel, fine-rayed pigtoe mussel, heavy pigtoe, ovate clubshell mussel, southern clubshell mussel, and stirrup shell mussel. EPA is initiating consultation for these species pursuant to 50 C.F.R. Part 402, Subpart B.

## A. Introduction

EPA properly concluded that atrazine is "likely to adversely affect" seven of the endangered freshwater mussels in particular respects. However, EPA's further conclusion that atrazine is

"not likely to adversely affect" the seven species in other respects is arbitrary and capricious.[1] In reaching this finding, EPA consistently underestimated potential adverse effects to endangered mussels by omitting critical factors from the analysis, such as the impact of inert ingredients, pesticide mixtures, and sublethal effects. The Fish and Wildlife Service should recommend mitigation measures for all uses of atrazine to prevent jeopardy to these listed species, and should require EPA to conduct a proper analysis of atrazine's adverse effects.

## B. Statutory and Regulatory Framework

Congress passed the ESA, 16 U.S.C. §§ 1531-44, in response to growing concern over the extinction of fish, wildlife, and plants stemming from "economic growth and development untempered by adequate concern and conservation." 16 U.S.C. § 1531(a)(1). Recognizing that "these species of fish, wildlife, and plants are of aesthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people," *id.* § 1531(a)(3), Congress enacted what the Supreme Court has described as the "most comprehensive legislation for the preservation of endangered species ever enacted by any nation." *Babbitt v. Sweet Home Chapter of Communities for a Greater Oregon*, 515 U.S. 687, 698 (1995) (quoting *Tennessee Valley Authority ("T.V.A.") v. Hill*, 437 U.S. 153, 180 (1978)). The stated purpose of the ESA is to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, [and] to provide a program for the conservation of such endangered species and threatened species." *Id.* § 1531(b). The Supreme Court has held that the ESA reflects "an explicit congressional decision to afford first priority to the declared national policy of saving endangered species." *T.V.A.*, 437 U.S. at 185.

Several of the ESA's key mandates are contained in section 7 of the Act, which directs all federal agencies, in consultation with the Service, "to utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species," 16 U.S.C. § 1536(a)(1), and to ensure that all actions authorized, funded, or carried out by such agencies are "not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical habitat] of such species." *Id.* § 1536(a)(2). Agency actions subject to this requirement include "all activities or programs of any kind authorized, funded, or carried out, in whole or in part" by the agency, including the "granting of licenses, contracts . . . [and] permits," and "actions directly or indirectly causing modifications to the land, water, or air." 50 C.F.R. § 402.02.

Section 7 implementing regulations require that a federal agency complete formal consultation with the Service if either: a) the federal agency determines that an action "may affect listed species or critical habitat"; or b) the Service determines that an action may affect listed species or critical habitat and "request[s the] Federal agency to enter into consultation." *Id.* § 402.14(a). A federal agency may bypass "formal" consultation and, instead, complete "informal" section 7 consultation, *see id.* § 402.13, *only* if the federal agency or Service determines that an action may affect listed species or critical habitat, *and* the "Federal agency determines, *with the written*

[1] EPA has concluded that one of the eight species assessed, the stirrup shell mussel, is presumed to be extinct.

*concurrence of [the Service]*, that the proposed action is not likely to adversely affect any listed species or critical habitat." *Id.* § 402.14(b) (emphasis added).

To guide agencies in making a "may affect determination," the Endangered Species Consultation Handbook defines "may affect" as "the appropriate conclusion when a proposed action may pose *any* effects on listed species or designated critical habitat." FWS & NMFS, *Endangered Species Consultation Handbook*, at xvi (March 1998) (emphasis in original). If the action is likely to adversely affect the listed species or its critical habitat, the agency must conduct a formal consultation. The Consultation Handbook defines "is likely to adversely affect" as *any* adverse affect that *may* occur as a direct or indirect result of the federal action that is not discountable, insignificant, or beneficial. *Id.* at 3-13. To initiate formal consultation, an agency must assess the impacts of the action on listed species and their habitat and provide all relevant information about such impacts, including the best scientific and commercial data available, to the expert fish and wildlife agency. 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14. The end product of formal consultation is a biological opinion in which FWS or NMFS must determine whether the action will jeopardize the survival of a listed species or will adversely modify the species' critical habitat. 16 U.S.C. § 1536(b). In preparing the biological opinion, FWS or NMFS must review all relevant information and provide a detailed evaluation of the action's effects on the listed species and critical habitat, including the cumulative effects of federal and nonfederal activities in the area. *Id.* § 1536(b)(3)(A); 50 C.F.R. § 402.14(g)-(h).

### C. Atrazine Is a Widespread Environmental Contaminant that Poses Significant Threats to Wildlife

Atrazine is heavily used throughout the country. EPA first registered atrazine in 1958 and recently reregistered atrazine pursuant to FIFRA section 4. Atrazine is one of the most widely used herbicides in the United States, with approximately 64 million to 76 million pounds of active ingredient applied annually. *See* EPA, *Interim Reregistration Eligibility Decision for Atrazine*, at 11 (Jan. 31, 2003) ("Atrazine IRED"). It is used on major food crops such as corn, sorghum, and sugarcane, as well as non-crop areas such as golf courses and residential developments, across the United States. *Id.* Atrazine is applied directly to the soil during crop pre-planting and pre-emergence.

Atrazine is both persistent and mobile in surface and ground water. *See* Atrazine IRED at 50-51; EPA, *Atrazine, Reregistration Eligibility Science Chapter, Environmental Fate and Effects Chapter*, at 2 (April 22, 2002) ("Atrazine EFEC").[2] Predictably, the heavy use of atrazine results in widespread environmental contamination. Atrazine contamination of air, water, and rainfall occurs through leaching, runoff, and spray drift. Atrazine EFEC at 3-5, 19-20. Regarding surface and ground water contamination, EPA states that "[b]ecause of its persistence and mobility, atrazine is *expected* to reach surface and ground water. This is confirmed by widespread detections of atrazine in surface water and ground water." *Id.* at 19 (emphasis added).

[2] The Atrazine IRED provides a summary of the risk assessment presented in the Atrazine EFEC, and refers readers to the Atrazine EFEC for a more detailed discussion of the assessment. *See* Atrazine IRED at 49.

Atrazine's persistence in water varies from 41 to 237 days. *See* Atrazine IRED at 50. Atrazine is also transported via runoff to surface water, and it can leach into groundwater. *Id*.; Atrazine EFEC at 19. Atrazine volatilization and spray drift result in aerial deposition and transportation through the atmosphere. EPA cites data from the American Association of Pest Control Operators that rank atrazine high among pesticides involved in spray drift complaints. *See* Atrazine EFEC at 3.

EPA has found that there is "widespread environmental exposure" to atrazine in aquatic communities and other ecosystems. *Id.* at 50, Atrazine EFEC at 2, 19. Atrazine has been "widely detected" in air and rainfall samples in both high use areas and areas far removed from high use areas. *See* Atrazine IRED at 52; Atrazine EFEC at 2, 19. Because atrazine is used primarily during crop pre-planting and pre-emergence, the levels of use are highest during spring rainfall season. This period is also the breeding season for most aquatic organisms. *See* NRDC & World Wildlife Fund, *Comments on Atrazine Preliminary Ecological Fate and Effects Risk Assessment*, at 3 (Nov. 26, 2001) ( "NRDC Comments on Preliminary EFEC") (Attachment A).

A review of USGS NAWQA stream monitoring data shows frequent detections of high atrazine levels in surface water in many states. EPA admits that these frequent and significant detections are likely underestimates of atrazine levels in streams: "The NAWQA stream monitoring data, though extensive, were not specifically designed to time monitoring to correspond to atrazine applications or specifically oriented to atrazine treatment areas. Thus, they are likely to *underestimate* the concentrations likely to be present in streams." Atrazine EFEC at 4 (emphasis added).

Atrazine is metabolized to four hydroxy compounds by plants and bacteria and to three chlorinated atrazine compounds by animals. *See* Atrazine IRED at 50-52. The chlorinated atrazine compounds are considered to be comparable in toxicity to atrazine. Because of the persistence of desethyl atrazine (one of atrazine's chlorinated metabolites), it is sometimes found in the environment in higher concentrations than atrazine. *Id.*

A number of agencies have identified atrazine as an endocrine disrupter, including the United Kingdom's Environmental Agency, the European Union, the Oslo and Paris Commission Convention for the Protection of the Marine Environment of the North-East Atlantic, and the State of Illinois. *See* NRDC Comments on Preliminary EFEC at 3. There is evidence of two atrazine modes of action, one involving the hypothalamic-pituitary-gonadal axis, and one involving the stimulation of aromatase activity which in turn increases endogenous conversion of androgens to estrogens. *Id.* at 4. This second mode of action is supported by studies in fish, alligators, salamanders, turtles and frogs. *Id.*

Both lab experiments and field studies using frogs have confirmed that atrazine alters gonadal development, with results including feminization and hermaphroditism. *See* NRDC Comments on Preliminary EFEC at 7-9. Research published in the *Proceedings of the National Academy of Sciences* by Dr. Tyrone Hayes and colleagues has revealed sexual defects caused by atrazine exposure in male frogs. *See* Hayes et al., *Hermaphroditic, Demasculinized Frogs after Exposure to the Herbicide Atrazine at Low Ecologically Relevant Doses*, 99 PNAS 5,476 (April 16, 2002).

These effects occur at very low doses, at or below levels commonly found in the environment. Field studies confirmed these results: hermaphroditism and gonadal deformities were observed in animals collected from atrazine-contaminated sites across the United States. *See* Hayes et al., *Atrazine-induced Hermaphroditism at 0.1 ppb in American Leopard Frogs (Rana pipiens): Laboratory and Field Evidence*, Environ. Health Perspectives doi:10.1289/ehp.5932 (Oct. 23, 2002). In addition, levels of atrazine at 1 μg/L have reduced the size of the laryngeal muscle in male frogs. *See* Hayes et al., 99 PNAS at 5,477.

Atrazine may adversely effect aromatase activity and gonadal development in reptiles also. In Maryland, researchers at the University of Maryland Biotechnology Institute, Center of Marine Biotechnology exposed terrapin turtle eggs to 1 ppb of atrazine in laboratory experiments. At this level, there were alterations in aromatase activity in the developing embryo. (*Personal Communications between Dr. Katherine Squibb and Dr. Alan Place* (Nov. 8, 2002 & March 4, 2003)). Studies in alligators indicate that "atrazine shows a weak affinity for the [alligator estrogen receptor] and causes testicular aromatase activity uncharacteristic of males or females . . . ." Milnes et al., *Effects of Incubation Temperature and Estrogen Exposure on Aromatase Activity in the Brain and Gonads of Embryonic Alligators*, Environ. Health Perspectives 110:393 (June 2002). The table below highlights the levels of atrazine that have endocrine and developmental effects on various species.

Endocrine Disruption and Altered Development by Atrazine Exposure

| SPECIES | EXPOSURE DOSE | ADVERSE EFFECT |
|---|---|---|
| Tiger Salamander | 75 μg/L | Change in metamorphism |
| Frogs | 0.1 μg/L | Altered sexual development |
| Terrapin Turtles | 1 ppb (dose to eggs) | Altered aromatase activity |
| Fish - large mouth bass | 50 μg/L | Altered aromatase activity |

Atrazine runoff often causes high-level pulses in surface water, and for a developmental toxicant and endocrine disruptor such as atrazine, short-term exposures to high levels are a significant concern. Irreversible effects can occur after relatively brief exposures during vulnerable developmental periods for many species. *See* NRDC, *Atrazine Detailed Evaluation Letter* at 3 (June 3, 2002) (Attachment B). The laboratory, microcosm, mesocosm and field studies used by EPA "suggest that atrazine concentrations measured in the environment could reach levels that are likely to have negative impact on sensitive aquatic species and communities." Atrazine IRED at 61. The exposure of aquatic communities to atrazine at levels 10-20 ppb can result in community-level and population-level effects. *Id.* at 4. In addition, atrazine exposure in aquatic communities may cause direct effects on aquatic non-vascular plants that could result in reductions in populations of aquatic macrophytes, invertebrates, and fish. *See* Atrazine EFEC at 2. Atrazine indirectly affects aquatic communities through loss of species sensitive to atrazine and resulting changes in structure and functional characteristics of the affected communities. *Id.*

The U.S. Fish and Wildlife Service submitted extensive comments to EPA in response to the Atrazine EFEC. Those comments notified EPA that atrazine's release into the environment is problematic. *See* FWS Comments to EPA at 1 (June 27, 2002) (Attachment C). Chronic exposure may occur to a wide range of biota, because atrazine is persistent in aquatic

environments and is transported via spray drift and runoff to surface water. *Id.* at 2. This chronic exposure is of concern because "altering a single key group within a biological community can alter the entire community." *Id.* at 7. FWS noted that EPA's risk assessment – which acknowledges significant ecological concerns – likely underestimates the "true potential for ecological impacts," in part because EPA did not consider sublethal effects of atrazine exposure, like the altered reproductive capacity of non-target organisms. *Id.* at 2-3. FWS also commented that EPA's use of surrogate species for toxicity testing may underestimate the threats to potentially more sensitive endangered species, because "different species can have different life histories, biological requirements and sensitivities to pesticides . . . ." *Id.* at 3.

### D. Syngenta's Atrazine Monitoring Data Reveals Widespread Environmental Contamination at High Levels Throughout the Midwest.

Pursuant to a Memorandum of Agreement with EPA, and as a condition of reregistration, Syngenta recently completed three years of ecological monitoring in 40 watersheds in corn-growing regions in the Midwest. (Attachment G). This data shows surprisingly high levels of atrazine contamination for extended periods of time across many of the sampled watersheds. Several watersheds appear especially hard hit by atrazine contamination:

- In watershed IN-04, 8% of samples for the year 2004 exceed 3ppb, and nearly 3% of samples for the year exceed 37.5ppb.
- In watershed IN-05, more than 21% of samples for the year 2004 exceed 3ppb, 8% of samples for the year exceed 10ppb, and 5% of samples for the year exceed 20ppb.
- In watershed IN-05 for 2006, 22.5% of samples exceed 3ppb, 7.5% of samples exceed 10ppb, 5% of samples exceed 20ppb, and 2.5% of samples exceed 37.5ppb.
- In watershed IN-09, nearly half of all samples (45.3%) for the year 2005 exceed 3ppb, more than 20% exceed 10ppb, and more than 11% exceed 37.5ppb.
- In watershed IN-11, more than 39% of samples for the year 2005 exceed 3ppb, more than 18% of samples exceed 10ppb, more than 12% of the samples exceed 20ppb, and more than 8% of the samples exceed 37.5ppb.
- In watershed MO-01, 36.9% of samples for the year 2004 exceed 3ppb, more than 19% of samples exceed 10ppb, more than 8% of samples exceed 20ppb, and more than 4% samples exceed 37.5ppb.
- In watershed MO-01, 40% of samples for the year 2005 exceed 3ppb, more than 20% of samples exceed 10ppb, more than 14% of samples exceed 20ppb, and more than 4% samples exceed 37.5ppb.
- In watershed MO-02, 55% of samples for the year 2004 exceed 3ppb, more than 23% of samples exceed 10ppb, more than 14% of samples exceed 20ppb, and more than 5% samples exceed 37.5ppb.
- In the same watershed, 55% of samples for the year 2005 exceed 3ppb, more than 27% of samples exceed 10ppb, and more than 5% of samples exceed 20ppb.
- In watershed NE-04, 22% of samples for the year 2005 exceed 3ppb, more than 13% of samples exceed 20ppb, and more than 9% samples exceed 37.5ppb.
- In the same watershed for 2006, 29% of samples exceed 3ppb, more than 16% of samples exceed 20ppb, and more than 14% samples exceed 37.5ppb.

These are annual summaries; many individual detections are obviously much higher, including a number of detections over 100ppb that persist for several days, and detections higher than 200ppb in some locations. Sampling in the months of May and June in particular shows harmful levels of atrazine in virtually every watershed. In watershed MO-01, for example, more than 1/3 of samples in June 2005 were over 10ppb, and more than 1/5 were over 20ppb. In the same watershed in May 2006, there was a maximum detection of 106ppb, and every single sample for the month was above 3ppb. Nearly 3/4 of samples that month were above 10ppb, more than half exceeded 20ppb, and more than 1/4 of samples exceeded 37.5 ppb.

These numbers are stunning, and they reveal pervasive surface water contamination throughout a large region of the country. These 40 watersheds were determined in advance to be statistically representative of 1172 vulnerable watersheds; therefore, the numbers in these watersheds should be assumed to be matched or exceeded in the more than 1100 additional vulnerable watersheds that were not sampled. It is inappropriate for EPA now to say that it lacks the ability to extrapolate from this data to the remainder of the 1172 vulnerable watersheds that the agency has identified. In the absence of additional monitoring or an appropriate means to extrapolate, EPA should assume that atrazine contamination levels in the other vulnerable watersheds are at least as high as the highest detections seen in the Syngenta monitoring.

## E. EPA's NLAA Determinations for These Species Are Arbitrary and Capricious

EPA has made both LAA and NLAA determinations for these seven endangered mussels, with different findings for different direct and indirect effects. First, EPA's LAA determinations for all of the species compel formal consultation, and that consultation must consider all possible effects on the species and all possible restrictions or mitigation measures to ensure no jeopardy. Second, EPA's NLAA determinations for certain possible routes of harm to these species are arbitrary and capricious, as outlined in this section and below in section F.

Atrazine is heavily used and commonly detected throughout the Midwest and the South, where these endangered mussels are found. A significant amount of the tens of millions of pounds of atrazine applied annually is concentrated in the Midwestern states of Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. USDA National Agricultural Statistics Service (NASS) data show that at least 14 million pounds of atrazine were applied in Illinois in 2001, 7.4 million pounds in Iowa, 7.3 million pounds in Indiana, 6.4 million pounds in Nebraska, 4.3 million pounds in Ohio, 4.2 million pounds in Kansas, 3.4 million pounds in Missouri, 2.9 million pounds in Minnesota, 1.9 million pounds in Michigan, 1.8 million pounds in Wisconsin, 1.6 million pounds in Kentucky, 1 million pounds in South Dakota, and 166,000 pounds in North Dakota.

By far the most significant crop use for atrazine in the Midwest is corn, and, according to EPA, "modeling simulations for corn show that atrazine concentrations in ponds exceed the levels at which studies have shown reductions in fish populations, invertebrate populations, macrophytes, and primary production *in 70 to 83 % of the years*." Atrazine EFEC at 3 (emphasis added). EPA summarizes a number of studies that detect potentially harmful levels of atrazine in a significant percentage of several hundred Mid-Western streams sampled. *See, e.g., id*. at 4. EPA cites reported atrazine concentrations of greater than 87 μg/L in a survey of 12 streams in Ohio, and

concentrations of 42 μg/L in rivers and reservoirs in Iowa. *See id.* at 19, 20. Also, "[m]onitoring data for 9 Mid-Western streams from 1990 to 1992 show that the highest pulse concentrations (20 to 90 μg/L) exceed many of the assessment endpoints for streams." *Id.* at 4. 1995 monitoring data on 50 Midwestern streams cited by EPA show that "[c]oncentrations where reductions in invertebrate populations and primary production are likely to occur were found in 17% to 35% of these streams, respectively." *Id*. 1989 monitoring data on 129 Midwestern streams show similar results: "atrazine levels where reductions in invertebrate populations and primary production are likely to occur were found in 12% to 34%, respectively," of the sampled streams. *Id*. EPA also cites a study reporting atrazine detection in 80% of rainfall samples in Iowa and 50% of rainfall samples in Minnesota. *See id*. at 20. Monitoring data conducted by Syngenta from 2004-06, summarized above and attached at Attachment G, shows consistently high detections of atrazine in surface water that persist for days, weeks, and even entire months.

USGS NAWQA water monitoring data for these Midwestern states also shows high detections. NAWQA data for Illinois shows over 50 samples greater than 4 μg/L, including one sample as high as 108 μg/L, and many samples above 20 μg/L. Detections in Ohio show atrazine in water at 30, 40, 50, 60, 70, and 80 μg/L at different sampling locations. More than 100 samples in Indiana exceeded 4 μg/L, including samples at 120 μg/L and 129 μg/L. Detections above 20 μg/L were measured in Iowa, Missouri, and Nebraska, and above 7 μg/L in Kentucky, Michigan, Minnesota, and Wisconsin. The NAWQA database – which EPA notes underreports atrazine in water – shows significant contamination of aquatic habitat in the Midwest.

Typical and approved use rates exceed EPA's levels of concern for endangered aquatic invertebrates and the aquatic vegetation that may provide freshwater mussel habitat. According to one author, "[f]reshwater mussels are the most endangered group of animals in the United States." Eric Biber, *The Application of the Endangered Species Act to the Protection of Freshwater Mussels: A Case Study*, 32 Envtl. L. 91, 91 (Winter 2002). Many freshwater mussel species, with habitat in the streams and rivers of the Midwest, "remain critically endangered and declining." *Id*. at 94. Pesticide contamination through agricultural runoff is believed to cause "mussel mortality or die-offs." *Id*. at 105 & n.59.

Environmental atrazine contamination is also a significant problem in the Southern states of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, and Texas, where some of the endangered mussels assessed are found. According to NASS statistics, at least 1 million pounds of atrazine were applied in Texas in 2001, 600,000 pounds in North Carolina, and 300,000 pounds in Georgia. According to the National Center for Food and Agricultural Policy (NCFAP), 1.5 million pounds of atrazine were applied in Louisiana in 1997, 1.2 million pounds in Florida, 500,000 pounds in Mississippi, 480,000 pounds in Arkansas, and 380,000 pounds in Alabama. *See* NCFAP Database, available online at http://www.ncfap.org/database.

USGS NAWQA water monitoring data for these Southern states also shows high detections. NAWQA data for Alabama shows atrazine detections of 136 μg/L (measured April 2000), 184 μg/L (measured April 1999), and *201 μg/L* (measured May 1999). The NAWQA database shows significant contamination of aquatic habitat in regions in the South where these mussels are located.

## F. EPA's Effects Determinations Contain Numerous Serious Scientific Flaws and Omissions that Understate and Ignore the Likelihood of Adverse Effects of Atrazine on These Species.

### 1. EPA failed to consider formulations and the effect of inert ingredients.

Each of these endangered mussels will be exposed to atrazine pesticide formulations, not just the isolated active ingredient. EPA, however, unreasonably limits its effects determination to the active ingredient alone – even though atrazine is never applied as an active ingredient alone in the real world.

Pesticide formulations contain a number of ingredients – referred to as "inert" – in addition to the active ingredient. Despite their name, inert ingredients can be biologically or chemically active, and are labeled inert only because of their intended function in the particular pesticide product. *See* Caroline Cox & Michael Surgan, *Unidentified Inert Ingredients in Pesticides: Implications for Human and Environmental Health*, Env. Health Perspectives (online Aug. 18, 2006) (Attachment D). Pesticide formulations have been documented to have greater toxicity than active ingredients alone. This is true for atrazine specifically, according to Cox and Surgan: "An herbicidal formulation containing atrazine increased DNA damage in human lymphocytes, while atrazine alone did not (Zeljezic et al. 2006)."[3]

EPA's failure to consider inert ingredients is a significant shortcoming recognized by both the FWS and the courts. *See Washington Toxics Coalition v. Dep't of Interior*, No. 2:04-cv-01998-JCC, slip op. at 14, 15, 34 (W.D. Wash. Aug. 24, 2006) (Attachment E)); FWS Letter at 3 (June 27, 2002) (Attachment C).

### 2. Improper environmental baseline analysis.

EPA improperly failed to consider background concentrations of other pesticides and other chemicals, to account for existing stressors. These seven endangered mussels will be exposed to a host of other pesticides and other toxins throughout their range, and this additional exposure should have been factored in. In particular, atrazine shares a common mechanism of toxicity with several other triazine pesticides. *See* http://www.epa.gov/oppsrrd1/cumulative/triazine_fs.htm; *see also* NRDC, *Comments on the Triazine Risk Assessment* (Aug. 21, 2006) (Attachment F). At the very least, EPA should have accounted for these species' exposure to other triazines in making its effects determinations regarding atrazine.

### 3. Failure to consider the full range of scientific and technical data available.

EPA's effects determinations for these endangered mussels fail to consider the full range of relevant and available scientific and technical data. As noted by the court in *Washington Toxics*

[3] Zeljezic D, Garaj-Vrhovac V, Perkovic P. 2006. Evaluation of DNA damage induced by atrazine and atrazine-based herbicide in human lymphocytes in vitro using a comet and DNA diffusion assay. Toxicol In Vitro 20(6):923-35.

recently, EPA has "omitted to perform any routine searches of the available scientific literature for relevant data." *Washington Toxics Coalition*, No. 2:04-cv-01998-JCC, slip op. at 46 (Attachment E). In particular, EPA's review for these seven species was largely limited to the ECOTOX database, which was specifically criticized as deficient and incomplete by technical experts at the Services and by the *Washington Toxics* court. *Id*. at 47-49. The result is an incomplete effects determination that fails to consider all possible adverse effects on these listed species.

## G. Conclusion

In light of the above, we believe that the Fish and Wildlife Service may not reasonably concur with EPA's conclusion that its registration of the pesticide atrazine is not likely to adversely affect (in certain respects) the seven listed mussels currently under consideration: the pink mucket pearly mussel, rough pigtoe mussel, shiny pigtoe pearly mussel, fine-rayed pigtoe mussel, heavy pigtoe, ovate clubshell mussel, and southern clubshell mussel.

FWS should recommend mitigation measures for all uses of atrazine within the habitat for these species. These mitigation measures should include, at a minimum, buffer zones, application rate reductions, and spray restrictions. In addition, FWS should require EPA to conduct a complete and comprehensive analysis of atrazine's adverse effects. EPA's NLAA determinations for these species are inadequate and contain several serious omissions. As part of the formal consultation required for EPA's LAA determinations for these species, FWS must require EPA to fully analyze the following:

- chronic and sublethal effects of atrazine on all life stages of these species, including immune system suppression, hormone disruption, behavioral effects, mutagenicity, and carcinogenicity;
- the effects of complete pesticide product formulations for atrazine (which is the only form in which atrazine is applied in real-world use), examining not only atrazine as an active ingredient but also "inert" ingredients, adjuvants, and all other ingredients in the formulations;
- additive and synergistic effects, especially with other triazine pesticides (for which EPA has conducted a cumulative risk assessment but failed to consider for purposes of these effects determinations);
- how direct and indirect effects of atrazine formulations added to the environmental baseline impact these species, which must include consideration of the impact of pesticide mixtures and other chemical exposures;

Thank you very much for your consideration.

Respectfully submitted,
*/s/ Aaron Colangelo*
Aaron Colangelo

cc: S. Jay Govindan