



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

MAY 29 2007

Arthur-Jean Williams
Associate Director
Environmental Fate and Effects Division
Office of Pesticide Programs
U.S. Environmental Protection Agency
Washington, DC

Subject: Request for Endangered Species Act Section 7 Informal Consultation on the Environmental Protection Agency's Re-Registration and Use of Atrazine in the Chesapeake Bay Watershed, September 1, 2006.

This responds to the Environmental Protection Agency's (EPA) September 1, 2006, request to the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) to review and concur with EPA's pesticide effects determination for the threatened loggerhead turtle (*Caretta caretta*) and green turtle (*Chelonia mydas*), the endangered shortnose sturgeon (*Acipenser brevirostrum*), Kemp's ridley turtle (*Lepidochelys kempii*), and leatherback turtle (*Dermochelys coriacea*) prepared pursuant to section 7 of the Endangered Species of 1973, as amended (16 U.S.C. 1536). EPA's effects determination concludes that the re-registration and continued use of atrazine (2-chloro-4-ethylamino-6-isopropylamino-s-triazine) within the Chesapeake Bay watershed is not likely to adversely affect listed species or any designated critical habitat for those species. We have reviewed EPA's effects determination using the substantive requirements of section 7, the relevant scientific and commercially available data on the toxicity of atrazine and the ecology of the listed species considered herein and do not concur with EPA's determination.

In our evaluation of EPA's conclusions regarding re-registration and continued use of atrazine in the Chesapeake Bay watershed, NMFS used information that was discarded, discounted, or otherwise not considered by EPA in the preparation of your September 1, 2006, effects determination as NMFS considers these materials among the best available science. We reviewed how the assessment adhered to processes described in EPA's January 23, 2004, document entitled Overview of the Ecological Risk Assessment Process for Threatened and Endangered Species Effects Determinations (Overview Document); EPA's April 2006 registration eligibility document (RED); the October 2003 revised interim registration eligibility document (IRED); other information and analyses relied on in preparing the effects determination, the open literature on the toxicological effects of atrazine and the ecology of the listed species considered herein.



Based on limited monitoring data, NMFS is aware that atrazine has reached concentrations of up to 98 µg /L in surface waters of the Chesapeake Bay watershed and peak concentrations may be substantially higher (Hall et al. 1999). Surface water monitoring data from other agriculturally dominated regions indicated that atrazine concentrations can exceed 100 µg /L, and that elevated surface water concentrations may persist for more than a month (EPA 2007). We expect that there may be locations and periods when listed species would be exposed to atrazine concentrations of up to 30 µg /L or greater based on the monitoring data and on estimates of annual average atrazine use of over 500,000 lbs/year in Maryland, 1.5 million lbs/year in Pennsylvania and 600,000 lbs/year in Virginia on corn and sorghum alone.

Toxicity data suggest these concentrations are likely to adversely affect listed species in the Chesapeake Bay watershed due to either direct toxicity, or habitat associated impacts. In its request for consultation, EPA concluded that acute exposure to atrazine at concentrations below 100 µg/L, and chronic exposure of less than 65 µg/L atrazine would result in no direct effects to shortnose sturgeon. However, the acute threshold of 100 µg/L used by EPA was based on an LC50 study that was 74-fold less sensitive than the median lethal concentration available for another surrogate species in EPA's ECOTOX database. An array of other adverse effects to fishes were observed at atrazine concentrations (0.5 – 10 µg/L) well below the acute threshold of 100 µg/L (Waring and Moore 2004, Tierney et al. 2007, Moore and Lower 2001). Additionally, the threshold of 65 µg/L used by EPA for chronic exposure was 135-fold less sensitive than 0.5 µg/L, the concentration of atrazine that impairs fish reproductive and behavioral endpoints (Moore and Lower 2001, Saglio and Trijase 1998). Although the data suggest direct, adverse effects to an individual sturgeon's survival, reproduction, and distribution, these endpoints were not used in EPA's effect determination. The studies reviewed by NMFS suggest that adverse effects likely occur at concentrations of atrazine well below 65 and 100 µg/L. Consequently, the actual risk to listed species of atrazine use in the Chesapeake Bay watershed may be significantly underestimated in the current assessment.

Based on our analysis of this information we expect atrazine may affect, and is likely to adversely affect the endangered shortnose sturgeon because measured and predicted atrazine concentrations would likely reduce a sturgeon's ability to migrate from freshwater to saltwater (Moore and Lower 2004), impair olfactory mediated behaviors important to survival, growth and reproduction (Tierney et al. 2007, Moore and Lower 2001, Saglio and Trijase 1998), and in some sensitive individuals potentially lead to acute lethality (Birge et al. 1979, EPA 2006, Table 2 in Appendix).

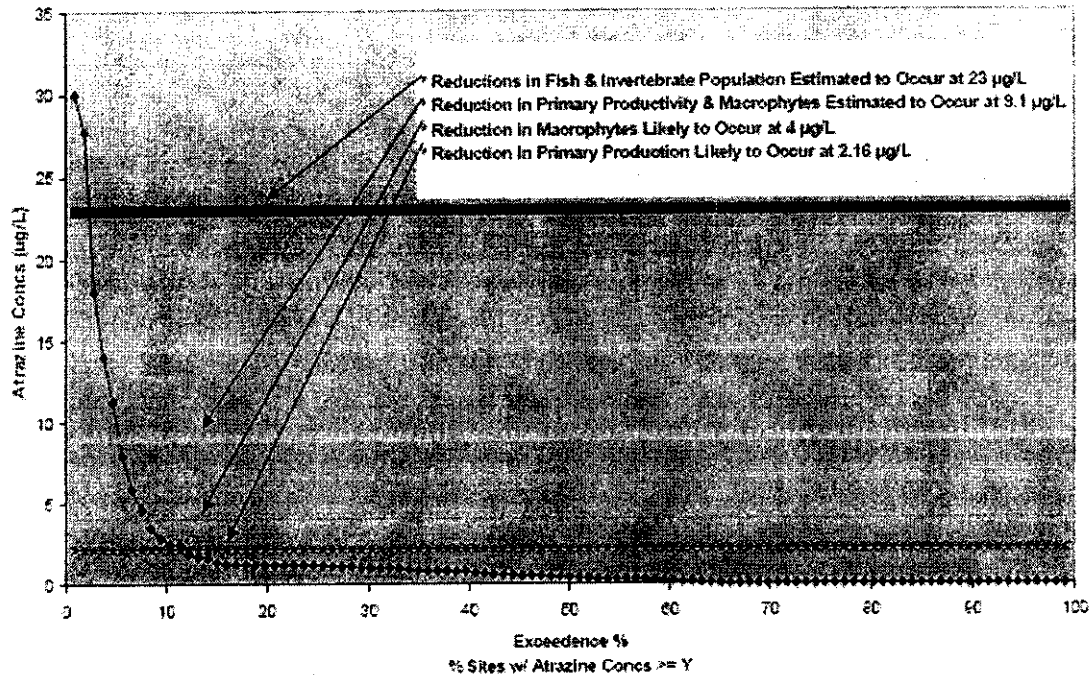
Sea turtles will be exposed to atrazine through dermal, oral, and dietary routes. Direct toxicity of atrazine to sea turtles remains uncertain as toxicity data for sea turtles and closely related species with relevant routes of exposure are not available. EPA concluded that atrazine exposure would result in no direct effects to listed sea turtles based on avian dietary toxicity data. However, NMFS cannot concur with that determination because toxicity data with other vertebrate species suggest atrazine may affect, and is likely to adversely affect threatened and endangered sea turtles within the Chesapeake Bay

watershed. For example, toxicity studies in amphibians and fish suggest adverse sublethal effects in sea turtles are likely including endocrine mediated effects and effects to olfaction which may impair growth, survival, and reproduction (Keller and McClean-Green 2004, Vonier et al. 1996, Crain 1997, Hayes et al. 2002a, Hayes et al. 2002b).

Atrazine effects to aquatic primary producers including periphyton, algae, and macrophytes result in adverse cascading ecological responses of exposed aquatic habitats. For example, consumer species feeding on fewer, smaller, primary producers may have reduced feeding efficiency and therefore reduced growth (DeLorenzo and Serrano 2003). Concentrations between 1.89 and 2.16 $\mu\text{g/L}$ have been shown to cause adverse impacts on primary productivity (Lakshminarayana et al 1992 and EPA 2002). Experimental ecosystems indicate statistically significant adverse impacts to primary producers can occur at concentrations as low as 1 $\mu\text{g/L}$ (Lampert et al 1989). Atrazine has been monitored in Chesapeake Bay surface waters at concentrations EPA previously concluded would reduce primary production and fish and invertebrate populations (EPA 2002, Figure 1). NMFS agrees with EPA's previous conclusion that these data are "likely to underestimate the concentrations likely to be present in streams" because sampling was not designed to correspond with atrazine treatment areas, timing of atrazine applications, or runoff events (EPA 2002).

Concentrations of atrazine are likely to directly reduce benthic macroalgae and sea grasses that the herbivorous green turtles feed on in shallow water habitats. Therefore, NMFS expects that reductions of primary producers due to atrazine exposures may affect, and is likely to adversely affect green turtles by reducing turtle's foraging success and potential growth. Additionally, reductions in primary production can reduce and alter the availability of benthic and epibenthic invertebrates, which are primary prey items for foraging sturgeon. Yolk-sac fry that are transitioning to feeding on live prey are expected to be particularly susceptible to reductions in available prey, given they have a finite time before starvation effects manifest (a few days). Therefore, NMFS expects atrazine-induced habitat effects may affect, and is likely to adversely affect juvenile shortnose sturgeon.

Figure 1. Surface Water Monitoring Results for Atrazine in the Chesapeake Bay's Tidal Rivers Maximum Concentrations by Site and Year (1977-1993). (Figure from EPA 2002, page 59).



NMFS is also concerned that EPA did not adhere to the methods described in the Overview Document to determine effects to aquatic communities. Specifically, EPA employed the Comprehensive Aquatic Systems Model (CASM), after levels of concerns (LOC) for aquatic species were exceeded in its earlier screens. Of particular concern to NMFS is the use of the LOC derived from CASM to form the basis of EPA's determination that re-registration and continued use of atrazine in the Chesapeake Bay watershed is not likely to adversely affect listed resources. CASMs had not been previously reviewed by NMFS in its evaluation of the Overview Document and thus its effectiveness in accurately predicting effects to aquatic systems is unknown. CASM was originally intended to assist in estimating ecological risks when critical laboratory or field data are sparse. NMFS does not understand why CASM was used in EPA's atrazine assessment, since atrazine is one of the most data rich pesticide active ingredient currently registered.

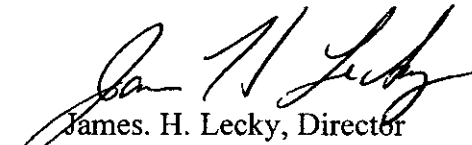
There is a significant body of literature that indicates adverse effects to aquatic communities resulting in cascading ecological effects are likely to occur at or below atrazine concentrations set by the CASM-derived Levels of Concern (12-38 µg/L). These effects are likely to manifest at 1 µg/L (see Table 4 in technical appendix). In

addition, previous assessments indicated adverse effects to aquatic communities where concentrations of atrazine are between 10-20 µg /L (EPA 2002, Huber 1993, Draxal 1994 and Brock et al. 2000). While these concentrations may not result in death to individuals of the listed species considered in this consultation we expect they are sufficient to indirectly affect growth rates via reduction in prey abundance or cover and thus indirectly affect their reproduction and survival in the wild. Concentrations of atrazine that have the capacity to significantly affect the ecology (the interaction with the biotic and abiotic environment), the physiology (biochemistry, energetics, timing of life events, etc), social and reproductive behaviors and community ecology (interaction with predators, prey and competitors) of listed individuals also have the capacity to sufficiently reduce their likelihood of reproduction and survival in the wild.

Based on this information we recommend that EPA initiate formal section 7 consultation on the effects of atrazine on the aforementioned listed species and their habitats throughout the entirety of their range and address the substantive issues raised in the attached technical appendix in EPA's request for formal consultation to insure that your initiation package includes all necessary and relevant information to conclude formal consultation in a timely manner. At a minimum, we suggest that you include all information required at 50 CFR 402.14(c), including an assessment of the inter-related and inter-dependent effects of your re-registration action, e.g., the effects of all atrazine end use products and allowable tank mixes.

We appreciate the opportunity to comment on your effects determination and look forward to your continued cooperation in the conservation of listed species and their habitats. Should have any additional questions or concerns regarding this response please contact Dr. Tony Hawkes of my staff at (360)753-4374.

Sincerely,



James. H. Lecky, Director
Office of Protected Resources

cc: Nancy Golden, FWS, Arlington, VA
cc: Marjorie Nelson, FWS, Arlington, VA