**APPENDIX 4-6. Analysis Method and Results for Downstream Monitoring**

After a species has been classified as an No Effect or Not Likely to Adversely Affect, EPA conducted a final analysis to ensure that no sources upstream of a species range or critical habitat would affect the species. To do this, evaluated the monitoring data with regards to the location to the species range/ critical habitat (e.g., upstream or downstream) to determine if any detections of the pesticide had occurred.

To do this analysis, EPA first used Esri ArcGIS tools to identify streams (NHDPlus Version 2[[1]](#footnote-2)) that crossed the boundary of the species range/critical habitat. EPA then used the latitude and longitude data for monitoring sites obtained from the Water Quality Portal (<https://www.waterqualitydata.us/portal/>) to index the sites to NHDPlus stream segments. EPA developed Python scripts that utilize NHDPlus to identify monitoring sites that hydrologically connected to each species range/critical habitat and provide a corresponding upstream/downstream distance and hydrologic travel time between the monitoring site and the range/critical habitat. EPA then categorized the connected monitoring sites into three areas: those sites that occurred within the borders of the species range/critical habitat; those sites that occurred within 68 -stream miles upstream of the species range/critical habitat; and those sites that occurred greater than 68- stream miles upstream of the species range/critical habitat. The 68-stream mile limit was initially used to identify those sites that were within a 1-day travel time of the species range/critical habitat. Only upstream locations were categorized for the analysis as there is uncertainty in the downstream monitoring sites as to where the pesticide originated. Given the chemical’s persistence, it would also be important to evaluate sites beyond this distance, as the pesticide still might reach the species range/critical habitat.

Results of the analysis for atrazine for species ranges and critical habitats are provided in **Tables 1** and **2**, respectively. For species ranges, two species with an NLAA determination had samples collected in or upstream of the species range. One of these species (Entity ID 281) had samples collected in or upstream of their range but they were all non-detect (see **Table 1**). Therefore, this species remained NLAA for their range. One fish (Entity ID 249) had monitoring samples either in or upstream of the range that were detectable. This species was reclassified as LAA, weakest evidence, based on potential impacts to PPHD vectors. For species critical habitat, six species with an NLAA determination had samples collected in or upstream of the species range. Four of the species with NLAA determinations had samples collected in or upstream of their range but they were all non-detect (see **Table 2**). Therefore, these species remained NLAA for their range. Two species had monitoring samples either in or upstream of the range that were detectable. These species, which included two aquatic invertebrates (Entity IDs 482 and 7949) were reclassified as LAA, weakest evidence, based on potential impacts to PPHD vectors.

**Table 1. Summary of Monitoring Data Findings for NE/NLAA Species, Range**

| **Entity ID / Common Name** | **Were there sites in range?** | **Were there detections in range?** | **Summary** | **Were there sites w/i 68 mi upstream of range?** | **Were there detections w/i 68 mi upstream of range?** | **Summary** | **Were there sites > 68 mi upstream of range?** | **Were there detections at > 68 mi upstream of range?** | **Summary** | **Distance Info** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 249  Bonytail | No | No |  | Yes | Yes | There were 6 sites w/i 68 stream miles upstream of the species range, with a detection frequency of 8% (n=12), collected between 2009 and 2011. Concentrations ranged from 0.005 to 0.005 ug/L, with a time of travel ranging from < 1 and 1 days. | Yes | Yes | There were 49 sites greater than 68 stream mi upstream of the species range, with a detection frequency of 0.5% (n=218), collected between 2009 and 2018. Concentrations ranged from 0.007 to 0.007 ug/L, with a time of travel ranging from < 1 and 17 days. | Distances for monitoring sites were from 103 to 1032 stream miles upstream of the species range. |
| 281  Little Colorado spinedace | No | No |  | No | No |  | Yes | No | There were 5 sites greater than 68 stream mi upstream of the species range, with a detection frequency of 0% (n=8), collected between 2011 and 2011. All samples were ND. | Distances for monitoring sites were from 964 to 1032 stream miles upstream of the species range. |

**Table 2. Summary of Monitoring Data Findings for NE/NLAA Species, Critical Habitat**

| **Entity ID / Common Name** | **Were there sites in range?** | **Were there detections in range?** | **Summary** | **Were there sites w/i 68 mi upstream of range?** | **Were there detections w/i 68 mi upstream of range?** | **Summary** | **Were there sites > 68 mi upstream of range?** | **Were there detections at > 68 mi upstream of range?** | **Summary** | **Distance Info** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 209  Humpback chub | No | No |  | No | No |  | Yes | No | There were 37 sites greater than 68 stream mi upstream of the species critical habitat, with a detection frequency of 0% (n=169), collected between 2009 and 2018. All samples were ND. | Distances for monitoring sites were from 248 to 1032 stream miles upstream of the species CH. |
| 249  Bonytail | No | No |  | No | No |  | Yes | No | There were 46 sites greater than 68 stream mi upstream of the species critical habitat, with a detection frequency of 0% (n=197), collected between 2009 and 2018. All samples were ND. | Distances for monitoring sites were from 248 to 1032 stream miles upstream of the species CH. |
| 275  Desert pupfish | Yes | No | There was 1 site in the species critical habitat, with a detection frequency of 0% (n=1) between 2012 and 2012. All samples were ND. | No | No |  | No | No |  |  |
| 482  Kentucky cave shrimp | No | No |  | Yes | Yes | There was 1 site w/i 68 stream mi upstream of the species critical habitat, with a detection frequency of 36% (n=28), collected between 2002 and 2005. Concentrations ranged from 0.18 to 0.88 ug/L, with a time of travel of < 1 day. | No | No |  |  |
| 1380  San Bernardino springsnail | Yes | No | There was 1 site in the species critical habitat, with a detection frequency of 0% (n=1), between 2005 and 2005. All samples were ND. | No | No |  | No | No |  |  |
| 7949  Southern kidneyshell | No | No |  | Yes | Yes | There were 18 sites w/i 68 stream mi upstream of the species critical habitat, with a detection frequency of 39% (n=18), collected between 2015 and 2019. Concentrations ranged from 3.60E-03 to 0.020 ug/L, with a time of travel ranging from < 1 and 8 d | Yes | Yes | There were 61 sites greater than 68 stream mi upstream of the species critical habitat, with a detection frequency of 50% (n=116), collected between 2004 and 2020. Concentrations ranged from ND to 4.56 ug/L, with a time of travel ranging from < 1 and 8 d | Distances for monitoring sites were from 69 to 229 stream miles upstream of the species CH. |

1. U.S. Geological Survey, 2011, National Hydrography Dataset (ver. NHDPlusV2), now maintained at  URL <https://www.epa.gov/waterdata/nhdplus-national-hydrography-dataset-plus>  [↑](#footnote-ref-2)