**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 simazine for species ranges and critical habitats are provided in **Tables 1** and **2**, respectively. For species ranges, five species with an NLAA determination had samples collected in or upstream of the species range. All of these species had monitoring samples either in or upstream of the range that were detectable. Therefore, these species, which included three fish (Entity IDs 309, 311 and 312) and two aquatic invertebrates (Entity IDs 338 and 341) were reclassified as LAA, weakest evidence, based on potential impacts to PPHD vectors. For species critical habitat, one species with an NE determination (Entity ID 482) had samples collected in or upstream of the species critical habitat that were detectable; therefore, this species, an aquatic invertebrate, was reclassified as LAA, weakest evidence.

**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** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 309  Rio Grande Silvery Minnow | No | No |  | No | No |  | Yes | Yes | There were 154 sites greater than 68 stream mi upstream of the species range, with a detection frequency of 19% (n=296), collected between 1995 and 2018. Concentrations ranged from 0.058 to 0.67 ug/L, with a time of travel ranging from < 1 and 1 days. | Distances for monitoring sites were from 72 to 1799 stream miles upstream of the species range. |
| 311  Topeka shiner | No | No |  | Yes | No | There were 3 sites w/i 68 stream miles upstream of the species range, with a detection frequency of 0% (n=46), collected between 2004 and 2017. All samples were ND. | Yes | Yes | There were 2810 sites greater than 68 stream mi upstream of the species range, with a detection frequency of 2% (n=42842), collected between 1988 and 2020. Concentrations ranged from 0 to 623 ug/L, with a time of travel ranging from < 1 and 31 days. | Distances for monitoring sites were from 73 to 1631 stream miles upstream of the species range. |
| 312  Santa Ana sucker | No | No |  | No | No |  | Yes | Yes | There were 4 sites greater than 68 stream mi upstream of the species range, with a detection frequency of 38% (n=55), collected between 1998 and 2015. Concentrations ranged from 0.02 to 0.69 ug/L, with a time of travel ranging from < 1 and 2 days. | Distances for monitoring sites were from 73 to 118 stream miles upstream of the species range. |
| 338  Rough pigtoe | No | No |  | Yes | No | There were 3 sites w/i 68 stream miles upstream of the species range, with a detection frequency of 0% (n=53), collected between 1994 and 2018. All samples were ND. | Yes | Yes | There were 2069 sites greater than 68 stream mi upstream of the species range, with a detection frequency of 6% (n=28380), collected between 1988 and 2020. Concentrations ranged from 0 to 119 ug/L, with a time of travel ranging from < 1 and 38 d | Distances for monitoring sites were from 91 to 1346 stream miles upstream of the species range. |
| 341  Ring pink (mussel) | No | No |  | Yes | No | There were 3 sites w/i 68 stream miles upstream of the species range, with a detection frequency of 0% (n=53), collected between 1994 and 2018. All samples were ND. | Yes | Yes | There were 2072 sites greater than 68 stream mi upstream of the species range, with a detection frequency of 6% (n=28385), collected between 1988 and 2020. Concentrations ranged from 0 to 119 ug/L, with a time of travel ranging from < 1 and 38 d | Distances for monitoring sites were from 91 to 1346 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** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 482  Kentucky cave shrimp | No | No |  | Yes | Yes | There were 1 sites w/i 68 stream mi upstream of the species critical habitat, with a detection frequency of 60% (n=5) collected between 2006 and 2006. Concentrations ranged from 0 to 0.0495 ug/L, with a time of travel of < 1 day. | No | No |  |  |

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)