**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.

For species’ ranges, three species (Entity IDs 226, 807, and 4766) had no samples collected in or upstream of the species range, while six species (Entity IDs 207, 309, 517, 677, 870, and 10052) had samples collected in or upstream of their range that were all non-detect. As a result, these nine species will remain NLAA for their range. Six species had monitoring samples either in or upstream of the range that were detectable. One species (with two Entity IDs, 135 and 136) was the Roseate tern, which feeds on fish. This species has a relatively high threshold for effects to the species and impacts to PPHD vectors, such that effects were not predicted using modeled EECs. Two of the species (Entity IDs 580 and 1199) were plants and will remain NLAA because methomyl does not exhibit toxicity to plants. Therefore, these four species will remain NLAA. The final two species (Entity IDs 187 and 249) are aquatic species that could be affected by downstream transport of methomyl, and will therefore be reclassified as LAA, Weakest Evidence.

For species’ critical habitat, six species (Entity IDs 238, 264, 281, 439, 4766, and 8172) had no samples collected in or upstream of the species critical habitat, while six species (Entity IDs 204, 206, 207,309, 870, and 1740) had monitoring samples collected in the species critical habitat that were all non-detect. As a result, these twelve species will remain NLAA for their critical habitat. Two species had monitoring samples either in or upstream of the critical habitat that were detectable. The plant species (Entity ID 580) will remain NLAA because methomyl does not exhibit toxicity to plants. The remaining species (Entity ID 249) is aquatic that could be affected by downstream transport of methomyl, and will therefore be reclassified as LAA, Weakest Evidence.

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

| **Entity ID / Common Name** | **Were there sites in range?** | **Were there detections in range?** | **Were there sites w/in 68 mi upstream of range?** | **Were there detections w/in 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** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 135Roseate Tern | No | No | Yes | Yes | There were 121 sites within 68 stream miles upstream of the species range, with a detection frequency of 0% (n=1377), collected between 1993 and 2019. Concentrations ranged from 0.00312 to 0.046 ug/L, with a time of travel ranging from <1 and > 365 days. | Yes | Yes |  There were 153 sites greater than 68 stream miles upstream of the species range, with a detection frequency of 1% (n=937), collected between 1993 and 2019. Concentrations ranged from 0.00287 to 0.0238, with a time of travel ranging from <1 and > 365 days. | Distances for monitoring sites were from 68 to 473 stream miles upstream of the species range. |
| 136Roseate Tern | No | No | Yes | Yes | There were 14 sites within 68 stream miles upstream of the species range, with a detection frequency of 2% (n=465), collected between 1986 and 2013. Concentrations ranged from 0.02 to 0.47 ug/L, with a time of travel ranging from < 1 and > 365 days. | Yes | No | There were 18 sites greater than 68 stream mi upstream of the species range, with a detection frequency of 0% (n=72), collected between 1997 and 2014. All samples were ND. | Distances for monitoring sites were from 145 to 853 stream miles upstream of the species range. |
| 187Giant garter snake | No | No | Yes | Yes | There were 11 sites within 68 stream miles upstream of the species range, with a detection frequency of 8% (n=25), collected between 1988 and 2011. Concentrations ranged from 0.32 to 12 ug/L, with a time of travel ranging from < 1 and > 365 days. | Yes | No | There were 168 sites greater than 68 stream miles upstream of the species range, with a detection frequency of 0% (n=429), collected between 1994 and 2018. All samples were ND. | Distances for monitoring sites were from 70 to 514 stream miles upstream of the species range. |
| 207Mountain yellow-legged frog | No | No | Yes | No | There were 2 sites within 68 stream miles upstream of the species range, with a detection frequency of 0% (n=53), collected between 1998 and 2015. All samples were ND. | Yes | No | There were 2 sites greater than 68 stream miles upstream of the species range, with a detection frequency of 0% (n=2), collected between 2004 and 2004. All samples were ND. | Distances for monitoring sites were from 76 to 77 stream miles upstream of the species range. |
| 226Pahranagat roundtail chub | No | No | No | No |  | No | No |  |  |
| 249Bonytail | No | No | Yes | No | There were 6 sites within 68 stream miles upstream of the species range, with a detection frequency of 0% (n=6), collected between 2006 and 2009. All samples were ND. | Yes | Yes | There were 150 sites greater than 68 stream miles upstream of the species range, with a detection frequency of 2% (n=749), collected between 1988 and 2019. Concentrations ranged from 0.00153 to 0.43, with a time of travel ranging from < 1 and > 365 days. | Distances for monitoring sites were from 235 to 888 stream miles upstream of the species range. |
| 309Rio Grande Silvery Minnow | No | No | No | No |  | Yes | No | There were 61 sites greater than 68 stream miles upstream of the species range, with a detection frequency of 0% (n=293), collected between 1994 and 2018. All samples were ND. | Distances for monitoring sites were from 1047 to 1780 stream miles upstream of the species range. |
| 517Chinese Camp brodiaea | No | No | No | No |  | Yes | No | There was 1 site greater than 68 stream miles upstream of the species range, with a detection frequency of 0% (n=10), collected between 2012 and 2017. All samples were ND. | Distances for monitoring sites were from 231 to 231 stream miles upstream of the species range. |
| 580Colusa grass | No | No | Yes | Yes | There were 18 sites within 68 stream miles upstream of the species range, with a detection frequency of 4% (n=202), collected between 1996 and 2019. Concentrations ranged from 0.0087 to 12 ug/L, with a time of travel ranging from > 365 days. | Yes | Yes | There were 323 sites greater than 68 stream mi upstream of the species range, with a detection frequency of 9% (n=1009), collected between 1982 and 2019. Concentrations ranged from 0.00155 to 3.3, with a time of travel ranging from < 1 and > 365 days. | Distances for monitoring sites were from 69 to 514 stream miles upstream of the species range. |
| 677Cumberland rosemary | No | No | No | No |  | Yes | No | There were 6 sites greater than 68 stream miles upstream of the species range, with a detection frequency of 0% (n=6), collected between 1996 and 2003. All samples were ND. | Distances for monitoring sites were from 591 to 609 stream miles upstream of the species range. |
| 807Little Aguja (=Creek) Pondweed | No | No | No | No |  | No | No |  |  |
| 870Texas wild-rice | No | No | No | No |  | Yes | No | There were 100 sites greater than 68 stream miles upstream of the species range, with a detection frequency of 0% (n=485), collected between 1982 and 2018. All samples were ND. | Distances for monitoring sites were from 220 to 1780 stream miles upstream of the species range. |
| 1199Louisiana quillwort | No | No | Yes | No | There were 7 sites within 68 stream miles upstream of the species range, with a detection frequency of 0% (n=17), collected between 2005 and 2005. All samples were ND. | Yes | Yes | There were 2 sites greater than 68 stream miles upstream of the species range, with a detection frequency of 2% (n=66), collected between 1998 and 2010. Concentrations ranged from 0.01 to 0.01, with a time of travel ranging from > 365 days. | Distances for monitoring sites were from 70 to 118 stream miles upstream of the species range. |
| 4766Three Forks Springsnail | No | No | No | No |  | No | No |  |  |
| 10052Rio Grande Silvery Minnow | No | No | No | No |  | Yes | No | There were 61 sites greater than 68 stream mi upstream of the species range, with a detection frequency of 0% (n=293), collected between 1994 and 2018. All samples were ND. | There were 61 sites greater than 68 stream mi upstream of the species range, with a detection frequency of 0% (n=293), collected between 1994 and 2018. All samples were ND. |

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

| **Entity ID / Common Name** | **Were there sites in CH?** | **Were there detections in CH?** | **Were there sites w/i 68 mi upstream of CH?** | **Were there detections w/i 68 mi upstream of CH?** | **Summary** | **Were there sites > 68 mi upstream of CH?** | **Were there detections at > 68 mi upstream of CH?** | **Summary** | **Distance Info** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 204Arroyo (=arroyo southwestern) toad | No | No | Yes | No | There were 2 sites w/i 68 stream miles upstream of the species critical habitat, with a detection frequency of 0% (n=8), collected between 2002 and 2005. All samples were ND. | Yes | No | There was 1 site greater than 68 stream miles upstream of the species critical habitat, with a detection frequency of 0% (n=2), collected between 2015 and 2015. All samples were ND. | Distances for monitoring sites were from 118 to 118 stream miles upstream of the species CH. |
| 206Chiricahua leopard frog | No | No | No | No |  | Yes | No | There was 1 site greater than 68 stream miles upstream of the species critical habitat, with a detection frequency of 0% (n=1), collected between 2005 and 2005. All samples were ND. | Distances for monitoring sites were from 106 to 106 stream miles upstream of the species CH. |
| 207Mountain yellow-legged frog | No | No | No | No |  | Yes | No | There was 1 site greater than 68 stream miles upstream of the species critical habitat, with a detection frequency of 0% (n=1), collected between 2004 and 2004. All samples were ND. | Distances for monitoring sites were from 77 to 77 stream miles upstream of the species CH. |
| 238Leopard darter | No | No | No | No |  | No | No |  |  |
| 249Bonytail | No | No | No | No |  | Yes | Yes | There were 146 sites greater than 68 stream miles upstream of the species critical habitat, with a detection frequency of 2% (n=725), collected between 1988 and 2019. Concentrations ranged from 0.00153 to 0.43 ug/L, with a time of travel ranging from < 1 and > 365 days. | Distances for monitoring sites were from 248 to 888 stream miles upstream of the species CH. |
| 264Ash Meadows speckled dace | No | No | No | No |  | No | No |  |  |
| 281Little Colorado spinedace | No | No | No | No |  | No | No |  |  |
| 309Rio Grande Silvery Minnow | No | No | No | No |  | Yes | No | There were 20 sites greater than 68 stream miles upstream of the species critical habitat, with a detection frequency of 0% (n=122), collected between 1994 and 2018. All samples were ND. | Distances for monitoring sites were from 1437 to 1780 stream miles upstream of the species CH. |
| 439Ash Meadows naucorid | No | No | No | No |  | No | No |  |  |
| 580Colusa grass | No | No | No | No |  | Yes | Yes | There were 15 sites greater than 68 stream miles upstream of the species critical habitat, with a detection frequency of 13% (n=64), collected between 1994 and 2017. Concentrations ranged from 0.07 to 0.39 ug/L, with a time of travel ranging from < 1 and 238 days. | Distances for monitoring sites were from 147 to 254 stream miles upstream of the species CH. |
| 870Texas wild-rice | No | No | No | No |  | Yes | No | There was 1 site greater than 68 stream miles upstream of the species critical habitat, with a detection frequency of 0% (n=2), collected between 1996 and 1998. All samples were ND. | Distances for monitoring sites were from 253 to 253 stream miles upstream of the species CH. |
| 1740Mountain yellow-legged frog | No | No | No | No |  | Yes | No | There were 6 sites greater than 68 stream miles upstream of the species critical habitat, with a detection frequency of 0% (n=19), collected between 2011 and 2014. All samples were ND. | Distances for monitoring sites were from 97 to 100 stream miles upstream of the species CH. |
| 4766Three Forks Springsnail | No | No | No | No |  | No | No |  |  |
| 8172Diminutive Amphipod | No | No | No | No |  | No | No |  |  |

1. <http://www.horizon-systems.com/nhdplus/> [↑](#footnote-ref-2)