# Appendix L-C

*Dichotomous Key for Critical Habitat*

***Dichotomous Key – Critical Habitats with Relevant PBFs***

This key serves as a tool and guide for identifying preliminary concern levels regarding the consequences of the Action on designated or proposed critical habitats that have physical and biological features (PBFs) that may be affected by malathion (relevant PBFs)[1]. Once a preliminary concern level (either *high* or *low*, as shown below) is reached for each relevant PBF of the critical habitat using the outputs from this key, biologists are instructed to continue the analysis, considering significant information about the PBF(s) or other factors that may influence the effects of the Action on the critical habitat. Conclusions of either "is not likely to destroy or adversely modify" or "is likely to destroy or adversely modify" are made for each critical habitat evaluated[2]. See *Critical Habitat Approach to the Assessment* in the main Opinion for more background on the critical habitat analysis and use of this key.

**1. <u>Overlap</u>**
*(Source: Spatial overlaps of use sites with critical habitats from the BE, as available. For critical habitats without overlaps from the BE, overlaps from the relevant species I&Ss were used as an approximation. Mosquito control use overlaps were calculated by the FWS.)*

1. a. Critical habitat overlaps with use sites.....go to 2
1. b. Critical habitat does not overlap with use sites.....Low concern

**2. <u>Federal Lands</u>**
*(Source: Federal lands overlaps with critical habitats calculated by the FWS.[3])*

2. a. < 95% of the critical habitat is on Federal lands.....go to 3
2. b. ≥ 95% of the critical habitat is on Federal lands.....Low concern

**3. <u>PBF(s)</u>**
*(Instruction: If more than one, follow each pathway that applies.)*

3. a. Non-arthropods (as prey, pollinators/seed dispersers, host fish) .....go to 4
3. b. Water quality.....go to 5
3. c. Arthropods (as prey, pollinators/seed dispersers).....go to 6
3. d. Habitat function .....go to 6

[1] Critical habitats with relevant PBFs include a subset of those in Category 1, based on relevancy of elements of PBFs determined to be essential to the species habitat, and Category 3, which have relevant PBFs specified in critical habitat rules. PBFs include any primary constituent elements described in critical habitat rules.
[2] The FWS's conclusions for all designated or proposed critical habitats, along with supporting rationales, are provided in Appendix L, Parts A (animals) and B (plants), of this Opinion.
[3] See the Federal Lands section in the *Approach to Usage Analysis* section of the main Opinion for more information regarding Federal land usage assumptions.

**4. Non-arthropod prey, pollinators/seed dispersers or hosts**
*(Instruction: Answer based on the prey, pollinator, seed disperser, or host taxa represented.)*

**Low risk**: Mammals, Snails, Clams, Crustaceans (any uses); Birds, Amphibians and Reptiles (if the only overlapping use is mosquito control[4])
**High risk**: Birds, Amphibians and Reptiles (any use(s), unless the only overlapping use is mosquito control); Fish (any use(s))

4. a. High risk to one or more PBF taxa.....go to 6
4. b. Low risk to all PBF taxa .....Low concern

**5. Water quality**
*(Instruction: Refer to species I&Ss for aquatic habitat bin types, or habitat descriptions in critical habitat rules or other reliable sources. See Table 1 below for habitat descriptions by aquatic habitat bin type as needed).*

**High or medium effects:** Bin 2 (low flow), Bin 5 (low volume), Bin 6 (moderate volume)[5]
**Low or no effects:** Bin 3 (moderate flow), Bin 4 (high flow), Bin 7 (high volume)

5. a. High or medium effects from exposure based on habitat type.....go to 6
5. b. Low effects from exposure based on habitat type .....Low concern

**6. Usage**
*(Source: Usage data from the species I&Ss for those uses within the critical habitat. See the Description of Critical Habitat Analysis section of the main Opinion for additional information regarding species range usage assumptions for the critical habitat analyses)*

6. a. Annual usage across the critical habitat area is >5% .....High concern
6. b. Annual usage across the critical habitat is ≤5%.....Low concern

If any relevant PBFs are found to be of high concern, the overall preliminary concern level would be high; if all are low concern, the overall preliminary concern level would be low. Once a preliminary concern level is reached, continue the analysis considering all relevant PBFs and any other relevant factors (e.g., specific functions and values of the PBFs, % on Federal lands, species uses of habitats by bin type, generalist/specialist prey, generalist/specialist host fish, pollinator/seed disperser needs, differences in effects on overlapping use sites, and any other important considerations).

[4] Given the major difference in application rates and patterns used for mosquito adulticide, which tend to result in lower exposures and fewer adverse effects to vertebrates, we do not anticipate adverse effects to birds, amphibians, and reptile prey when critical habitat only overlaps with mosquito adulticide use sites.
[5] EPA's modeling results show that bins 2, 5, and 6 generally have the highest estimated environmental concentrations across malathion use sites, indicating that these bins are most at risk for adverse effects to water quality PBFs.

**Table 1. Numerical bin assignments for generic aquatic habitats**[6]

| Bin and Generic Habitat Type | Depth (meters) | Width (meters) | Length (meters) | Flow ($m^3$/second) |
|---|---|---|---|---|
| 1 - Aquatic-associated terrestrial habitats | NA | NA | NA | NA |
| 2 - Low-flow | 0.1 | 2 | Length of field[1] | 0.001 |
| 3 - Moderate-flow | 1 | 8 | Length of field | 1 |
| 4 - High-flow | 2 | 40 | Length of field | 100 |
| 5 - Low-volume | 0.1 | 1 | 1 | 0 |
| 6 - Moderate-volume | 1 | 10 | 10 | 0 |
| 7 - High-volume | 2 | 100 | 100 | 0 |
| 8 - Intertidal nearshore | 0.5 | 50 | Length of field | NA |
| 9 - Subtidal nearshore | 5 | 200 | Length of field | NA |
| 10 - Offshore marine | 200 | 300 | Length of field | NA |

[1]Length of field – The habitat being evaluated is the reach or segment that abuts or is immediately adjacent to the treated field. The habitat is assumed to run the entire length of the treated area.

Exposure concentrations in surface water and benthic sediment pore water, downwind from the chemical's use are evaluated using AgDRIFT and AGDISP, as previously described in Section 1.5.1.1.c.1 [of EPA's biological evaluation]. NA indicates that concentrations were not calculated.

[6] Source: Modified from EPA's 2017 Malathion BE, Table 1-7