**Supplementary Material**

Table S1. Area (km2) of persistence, expansion, and contraction for showy milkweed, swamp milkweed, and monarch breeding distribution across Idaho under moderate and severe climate change scenarios.

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| --- | --- | --- | --- | --- |
| Projection |  | Showy Milkweed | Swamp Milkweed | Monarch |
| Current Suitable | | 15836 | 3125 | 11521 |
| Moderate (RCP 4.5) | Persistence | 14576 | 3124 | 10963 |
| Expansion | 29 | 3444 | 543 |
| Contraction | 1259 | 1 | 558 |
| Change in Suitable | | -1230 | +3443 | -15 |
| Severe (RCP 8.5) | Persistence | 14487 | 3125 | 10948 |
| Expansion | 31 | 5830 | 859 |
| Contraction | 1349 | 0 | 573 |
| Change in Suitable | | -1318 | +5830 | +286 |

Table S2. Area (km2) of projected persistence (P), expansion (E), and contraction (C) under a severe climate change scenario (RCP 8.5) for showy milkweed, swamp milkweed, and monarch breeding distribution in Idaho and selected managed areas across the state.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Agency1 | Managed Area | Showy Milkweed | | | Swamp Milkweed | | | Monarch | | |
| P | E | C | P | E | C | P | E | C |
|  | Statewide | 14487 | 31 | 1349 | 3125 | 5830 | 0 | 10948 | 859 | 573 |
| USFS National Grassland | Curlew | 32.8 | 0.0 | 0.9 | 0.1 | 66.5 | 0.0 | 24.0 | 11.2 | 0.0 |
| USFWS National Wildlife Refuge | Bear Lake | 60.3 | 0.0 | 4.2 | 0.0 | 0.0 | 0.0 | 54.7 | 15.2 | 0.0 |
| Camas | 23.4 | 0.0 | 4.5 | 0.0 | 0.9 | 0.0 | 24.1 | 0.6 | 0.0 |
| Deer Flat | 17.4 | 0.0 | 0.0 | 14.5 | 1.8 | 0.0 | 16.7 | 0.0 | 0.2 |
| Kootenai | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Minidoka | 43.0 | 0.0 | 2.7 | 7.5 | 41.7 | 0.0 | 42.1 | 1.0 | 0.0 |
| Oxford Slough | 3.6 | 0.0 | 0.0 | 0.0 | 7.4 | 0.0 | 3.6 | 0.1 | 0.0 |
| IDFG Wildlife Management Area | Big Cottonwood | 0.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Billingsley Creek | 1.1 | 0.0 | 0.0 | 0.9 | 0.2 | 0.0 | 1.1 | 0.0 | 0.0 |
| Boundary Creek | 1.2 | 0.0 | 1.6 | 0.0 | 0.0 | 0.0 | 0.7 | 0.0 | 1.4 |
| Carey Lake | 2.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 2.3 | 0.0 | 0.1 |
| Cartier Slough | 3.1 | 0.0 | 0.3 | 0.0 | 0.0 | 0.0 | 3.0 | 0.1 | 0.0 |
| CJ Strike | 38.5 | 0.1 | 0.1 | 37.4 | 1.1 | 0.0 | 38.3 | 0.1 | 0.1 |
| Fort Boise | 6.5 | 0.0 | 0.0 | 5.8 | 0.7 | 0.0 | 6.4 | 0.0 | 0.1 |
| Montour | 6.3 | 0.0 | 0.0 | 2.7 | 2.6 | 0.0 | 6.2 | 0.0 | 0.0 |
| Deer Parks | 1.8 | 0.0 | 0.1 | 0.0 | 3.6 | 0.0 | 2.0 | 1.0 | 0.0 |
| Farragut | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Hagerman | 4.2 | 0.0 | 0.0 | 3.4 | 0.6 | 0.0 | 4.2 | 0.0 | 0.0 |
| Market Lake | 6.6 | 0.0 | 2.6 | 0.0 | 7.9 | 0.0 | 8.0 | 1.0 | 0.0 |
| Niagara Springs | 4.1 | 0.0 | 0.0 | 2.6 | 1.0 | 0.0 | 3.8 | 0.0 | 0.0 |
| Payette River | 3.4 | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 |
| Cecil D Andrus | 4.0 | 0.0 | 0.4 | 1.4 | 2.0 | 0.0 | 3.3 | 0.0 | 0.1 |
| Craig Mountain | 40.4 | 0.2 | 0.7 | 6.1 | 5.7 | 0.0 | 33.5 | 0.6 | 1.3 |
| Mud Lake | 27.9 | 0.0 | 4.1 | 0.0 | 24.0 | 0.0 | 29.1 | 0.6 | 0.0 |
| Sterling | 12.8 | 0.0 | 0.9 | 6.3 | 9.0 | 0.0 | 13.3 | 0.3 | 0.0 |
| Coeur d’Alene River | 0.4 | 0.0 | 2.3 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.4 |
| Pend Oreille | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Portneuf | 1.0 | 0.0 | 0.1 | 0.0 | 0.3 | 0.0 | 0.6 | 0.1 | 0.0 |
| Boise River | 5.0 | 0.0 | 1.1 | 0.0 | 0.1 | 0.0 | 3.2 | 0.0 | 0.4 |

1 US Forest Service (USFS), US Fish and Wildlife Service (USFWS), Idaho Department of Fish and Game (IDFG)

|  |  |  |
| --- | --- | --- |
| January | February | March |
| April | May | June |
| July | August | September |
| October | November | December |

Figure S1. Monthly standard deviation of minimum temperature (°C) across 20 global climate models under a severe (RCP8.5) climate change scenario for mid-century. Color scales are standardized from 0.5 to 2.0 with warmer colors indicating the greatest variability among models while cooler colors show the most consistency.

|  |  |  |
| --- | --- | --- |
| January | February | March |
| April | May | June |
| July | August | September |
| October | November | December |

Figure S2. Monthly standard deviation of maximum temperature (°C) across 20 global climate models under a severe (RCP8.5) climate change scenario for mid-century. Color scales are standardized from 0.5 to 2.5 with warmer colors indicating the greatest variability among models while cooler colors show the most consistency.

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| --- | --- | --- |
| January | February | March |
| April | May | June |
| July | August | September |
| October | November | December |

Figure S3. Monthly standard deviation of precipitation (expressed as percent of 1981-2010 normals) across 20 global climate models under a severe (RCP8.5) climate change scenario for mid-century. Color scales are standardized from 0.05 to 0.60 with warmer colors indicating the greatest variability among models while cooler colors show the most consistency.