Table S1. Summary of physical characteristics and fish density at each study site in the Shiodomari River system.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
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| Sampling site | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Population type | Closed | Open | Open | Closed | Open | Open | Open | Open |
| Elevation (m) | 151 | 143 | 110 | 128 | 109 | 117 | 67 | 20 |
| **Physical characteristics** |  |  |  |  |  |  |  |  |
| Stream Width (cm) | 359 | 361 | - | 516 | 593 | - | - | - |
| Stream depth (cm) | 8.4 | 10.8 | - | 19.5 | 18.1 | - | - | - |
| Flow velocity (m/s) | 13.8 | 25.6 | - | 20.6 | 28.5 | - | - | - |
| Water temperature (℃)  | 15.15 | - | - | 14.98 | 15.14 | - | - | - |
| Substrate score | 3.36 | 4.26 | - | 2.49 | 3.52 | - | - | - |
| **Host population structure** |  |  | - |  |  | - | - | - |
| Age-0 density | 0.16 | 0.15 | - | 0.00 | 0.03 | - | - | - |
| Age-1< density | 0.07 | 0.13 | - | 0.07 | 0.05 | - | - | - |
| All density | 0.22 | 0.28 | - | 0.07 | 0.07 | - | - | - |
|  |  |  |  |  |  |  |  |  |

Note that host density did not include the migrant.

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| 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| Open | Closed | Open | Open | Open | Open | Open | Closed | Open | Closed | Open |
| 57 | 53 | 49 | 44 | 60 | 55 | 111 | 170 | 123 | 239 | 185 |
|  |  |  |  |  |  |  |  |  |  |  |
| 330 | - | 425 | - | 453 | - | - | 288 | 337 | 245 | 312 |
| 8.5 | - | 12.5 | - | 15.2 | - | - | 9.2 | 9.1 | 8.5 | 10.4 |
| 20.8 | - | 29.2 | - | 42.8 | - | - | 43.2 | 24.1 | 21.1 | 31.6 |
| - | - | 14.83 | - | - | - | - | 13.72 | 14.26 | 13.86 | 14.12 |
| 3.26 | - | 3.24 | - | 3.91 | - | - | 4.53 | 2.98 | 4.08 | 4.08 |
|  | - |  | - |  | - | - |  |  |  |  |
| 0.02 | - | 0.01 | - | 0.01 | - | - | 0.09 | 0.22 | 0.21 | 0.15 |
| 0.02 | - | 0.01 | - | 0.01 | - | - | 0.36 | 0.18 | 0.58 | 0.18 |
| 0.04 | - | 0.03 | - | 0.02 | - | - | 0.47 | 0.40 | 0.79 | 0.33 |