Supplementary materials

Table S1. Material examined for morphological measurements.

|  |  |  |
| --- | --- | --- |
| Species | N | Accession No. |
| *Campostoma anomalum* | 9 | AUM66138; AUM61539 |
| *Campostoma oligolepis* | 5 | AUM59074 |
| *Campostoma paucirdii* | 5 | AUM54815 |
| *Cyprinella galactura* | 5 | AUM56911 |
| *Cyprinella gibbsi* | 5 | AUM52011 |
| *Cyprinella spiloptera* | 5 | AUM17072 |
| *Cyprinella venusta* | 5 | AUM21 |
| *Ericymba amplamala* | 5 | AUM61303 |
| *Exoglossum laurae* | 2 | AUM57168 |
| *Hybopsis winchelli* | 5 | AUM31527 |
| *Luxilus chrysocephalus* | 5 | AUM65322 |
| *Luxilus coccogenis* | 5 | AUM19265 |
| *Lythrurus bellus* | 5 | AUM62540 |
| *Macrhybopsis aestivalis* | 5 | AUM63583 |
| *Macrhybopsis storeriana* | 5 | AUM64349 |
| *Nocomis leptocephalus* | 5 | AUM52208; AUM52247; AUM52164 |
| *Nocomis micropogon* | 5 | AUM29487 |
| *Nocomis platyrhynchus* | 5 | AUM66123; AUM61543; AUM66147; AUM661558 |
| *Notropis ammophilus* | 5 | AUM39972 |
| *Notropis baileyi* | 5 | AUM15749 |
| *Notropis leuciodus* | 5 | AUM66143 |
| *Notropis photogenis* | 5 | AUM30769 |
| *Notropis rubellus* | 5 | AUM19203 |
| *Notropis scabriceps* | 5 | AUM66124 |
| *Notropis stilbius* | 5 | AUM23365 |
| *Notropis texanus* | 5 | AUM31425 |
| *Notropis uranoscopus* | 5 | AUM63437 |
| *Notropis volucellus* | 5 | AUM29089 |
| *Phenacobius catostomus* | 5 | AUM32860 |
| *Phenacobius teretulus* | 5 | AUM66126 |
| *Pimephales notatus* | 5 | AUM34007 |
| *Pimephales vigilax* | 5 | AUM59086 |
| *Rhinichthys atratulus* | 5 | AUM52845 |
| *Rhinichtys cataractae* | 5 | AUM53279 |

Table S2. Description of linear measurements. Measurement abbreviations correspond to those used in Tables S3 and S5.

|  |  |  |
| --- | --- | --- |
| Measurement | Abbreviation | Description |
| Standard length | SL | Tip of upper jaw to end of hypural plate |
| Head length | HL | Tip of upper jaw to posterior edge of gill plate |
| Eye diameter | Eye | Horizontal diameter of eye |
| Head depth | HD | Vertical distance through the body at the middle of the eye |
| Snout length | SnL | Tip of upper jaw to anterior edge of eye |
| Eye height | EH | Vertical distance from ventral aspect of head to center of eye |

Table S3. Morphological measurements (mean per species; mm): standard length (SL), head length (HL), eye diameter (ED), head depth (HD), snout length (SnL), eye position (EP), relative gut length (RGL), and mouth angle (MA).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Species | N | SL | HL | ED | HD | SnL | EP | RGL | MA |
| *Campostoma anomalum* | 9 | 106.1 | 25.7 | 5.0 | 13.5 | 9.9 | 11.2 | 3.27 | 72.1 |
| *Campostoma oligolepis* | 5 | 106.2 | 24.1 | 4.6 | 11.8 | 9.7 | 10.0 | 3.03 | 77.7 |
| *Campostoma paucirdii* | 5 | 92.4 | 21.3 | 4.6 | 10.9 | 7.9 | 8.3 | 3.27 | 77.9 |
| *Cyprinella galactura* | 5 | 90.8 | 22.0 | 4.8 | 10.3 | 7.2 | 6.5 | 0.71 | 104.2 |
| *Cyprinella gibbsi* | 5 | 63.9 | 16.7 | 4.3 | 7.7 | 5.4 | 5.0 | 0.69 | 106.8 |
| *Cyprinella spiloptera* | 5 | 66.6 | 16.0 | 4.4 | 7.9 | 5.1 | 5.1 | 0.95 | 104.5 |
| *Cyprinella venusta* | 5 | 101.2 | 23.1 | 5.2 | 10.9 | 7.4 | 7.4 | 0.76 | 103.7 |
| *Ericymba amplamala* | 5 | 50.8 | 14.4 | 4.5 | 5.8 | 5.1 | 5.0 | 0.79 | 92.3 |
| *Exoglossum laurae* | 2 | 69.1 | 16.6 | 4.6 | 8.7 | 6.2 | 7.8 | 0.92 | 97.8 |
| *Hybopsis winchelli* | 5 | 50.2 | 12.4 | 4.4 | 5.3 | 4.4 | 2.2 | 0.80 | 82.2 |
| *Luxilus chrysocephalus* | 5 | 78.0 | 17.3 | 5.8 | 10.7 | 8.0 | 5.1 | 0.78 | 113.3 |
| *Luxilus coccogenis* | 5 | 78.2 | 21.8 | 6.0 | 11.0 | 7.6 | 4.6 | 0.60 | 110.1 |
| *Lythrurus bellus* | 5 | 45.2 | 11.0 | 3.5 | 5.8 | 3.3 | 3.9 | 0.71 | 120.6 |
| *Macrhybopsis aestivalis* | 5 | 47.7 | 12.9 | 3.7 | 5.7 | 5.0 | 4.9 | 0.76 | 76.9 |
| *Macrhybopsis storeriana* | 5 | 70.5 | 17.6 | 6.4 | 8.8 | 6.3 | 8.0 | 0.89 | 82 |
| *Nocomis leptocephalus* | 5 | 118.8 | 31.6 | 6.1 | 16.3 | 11.4 | 13.9 | 1.65 | 100.4 |
| *Nocomis micropogon* | 5 | 131.2 | 34.0 | 6.3 | 18.7 | 12.7 | 15.8 | 0.92 | 100.4 |
| *Nocomis platyrhynchus* | 5 | 168.2 | 44.9 | 7.1 | 27.7 | 18.0 | 21.8 | 1.47 | 99.5 |
| *Notropis ammophilus* | 5 | 41.3 | 11.2 | 3.3 | 5.2 | 3.9 | 4.1 | 1.01 | 96.6 |
| *Notropis baileyi* | 5 | 51.8 | 13.2 | 4.3 | 6.8 | 4.1 | 4.9 | 0.97 | 108.2 |
| *Notropis leuciodus* | 5 | 65.2 | 15.1 | 4.8 | 7.2 | 4.8 | 5.8 | 0.65 | 112.1 |
| *Notropis photogenis* | 5 | 80.7 | 19.0 | 6.0 | 8.8 | 6.0 | 6.6 | 0.65 | 116.8 |
| *Notropis rubellus* | 5 | 57.0 | 14.7 | 4.4 | 6.1 | 4.6 | 4.5 | 0.94 | 116.1 |
| *Notropis scabriceps* | 5 | 55.9 | 14.7 | 5.3 | 7.1 | 4.3 | 5.0 | 0.65 | 110.2 |
| *Notropis stilbius* | 5 | 61.4 | 15.3 | 5.3 | 7.4 | 4.9 | 5.1 | 0.66 | 118.3 |
| *Notropis texanus* | 5 | 55.5 | 13.7 | 4.8 | 6.7 | 4.4 | 5.5 | 0.72 | 106.2 |
| *Notropis uranoscopus* | 5 | 43.6 | 11.8 | 4.3 | 5.2 | 4.0 | 4.2 | 0.64 | 108.1 |
| *Notropis volucellus* | 5 | 46.0 | 11.1 | 3.9 | 5.3 | 3.4 | 4.1 | 0.74 | 103.7 |
| *Phenacobius catostomus* | 5 | 92.0 | 19.5 | 5.3 | 9.6 | 7.7 | 8.6 | 0.95 | 72.3 |
| *Phenacobius teretulus* | 5 | 75.7 | 17.7 | 4.7 | 9.4 | 7.5 | 7.4 | 0.85 | 70.8 |
| *Pimephales notatus* | 5 | 53.9 | 12.5 | 3.7 | 6.4 | 4.0 | 4.4 | 1.59 | 74.4 |
| *Pimephales vigilax* | 5 | 55.0 | 13.5 | 4.0 | 7.2 | 4.4 | 5.5 | 1.46 | 103.5 |
| *Rhinichthys atratulus* | 5 | 68.0 | 18.4 | 3.6 | 8.2 | 7.0 | 6.2 | 0.88 | 100.6 |
| *Rhinichthys cataractae* | 5 | 69.5 | 18.2 | 3.5 | 7.8 | 6.9 | 6.1 | 0.92 | 93.6 |

Table S4. Gut contents (% by volume).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Species | N | Algae | Plant  Material | Sediment | Molluscs | Aquatic  Insects | Terrestrial  Insects | Crustaceans | Seeds |
| *Campostoma anomalum* | 29 | 86.7 | 5.6 | 0.3 | 0 | 5.4 | 0.2 | 0 | 0 |
| *Campostoma oligolepis* | 27 | 68.6 | 4.4 | 1.2 | 0 | 25.1 | 0.1 | 0 | 0 |
| *Campostoma paucirdii* | 23 | 64.8 | 3.0 | 2.9 | 0 | 26.5 | 0.2 | 0 | 0 |
| *Cyprinella galactua* | 26 | 6.1 | 13.6 | 16.5 | 0 | 54.0 | 6.4 | 0 | 0.2 |
| *Cyprinella gibbsi* | 29 | 1.2 | 2.4 | 0.8 | 0 | 76.9 | 17.9 | 0 | 0.3 |
| *Cyprinella spiloptera* | 8 | 5.4 | 2.9 | 1.5 | 0 | 76.1 | 6.7 | 0 | 0.2 |
| *Cyprinella venusta* | 33 | 8.9 | 2.3 | 4.3 | 0 | 68.2 | 15.6 | 0 | 0.1 |
| *Ericymba amplamala* | 32 | 1.2 | 0.9 | 4.7 | 0 | 86.2 | 6.8 | 0 | 0.2 |
| *Exoglossum laurae* | 18 | 12.4 | 2.3 | 8.7 | 1.6 | 68.7 | 3.4 | 0 | 0.2 |
| *Hybopsis winchelli* | 11 | 3.4 | 2.1 | 3.5 | 0 | 86.3 | 3.2 | 0 | 0 |
| *Luxilus chrysocephalus* | 16 | 4.4 | 3.7 | 5.6 | 0 | 67.8 | 11.3 | 1.2 | 0 |
| *Luxilus coccogenis* | 18 | 3.2 | 2.4 | 1.8 | 0 | 79.4 | 4.2 | 0 | 0.3 |
| *Lythrurus bellus* | 31 | 2.3 | 1.2 | 4.5 | 0 | 58.4 | 27.8 | 0 | 1.3 |
| *Macrhybopsis aestivalis* | 24 | 5.4 | 4.9 | 26.1 | 0 | 62.3 | 1.1 | 0 | 0 |
| *Macrhybopsis storeriana* | 19 | 6.8 | 7.3 | 24.4 | 0.8 | 56.7 | 1.7 | 0 | 0 |
| *Nocomis leptocephalus* | 28 | 78.9 | 4.2 | 4.5 | 2.8 | 3.4 | 2.9 | 1.8 | 0 |
| *Nocomis micropogon* | 29 | 19.8 | 2.3 | 21.2 | 5.2 | 41.1 | 4.6 | 4.5 | 0 |
| *Nocomis platyrhynchus* | 14 | 76.8 | 3.3 | 4.2 | 3.1 | 6.4 | 2.8 | 1.3 | 0 |
| *Notropis ammophilus* | 34 | 20.4 | 16.8 | 30.1 | 0 | 30.4 | 1.6 | 0 | 0 |
| *Notropis baileyi* | 26 | 12.1 | 6.3 | 18.7 | 0 | 50.4 | 11.5 | 0 | 0.1 |
| *Notropis leuciodus* | 28 | 2.7 | 1.1 | 2.1 | 0 | 56.7 | 32.4 | 0 | 1.4 |
| *Notropis photogenis* | 11 | 2.0 | 0.2 | 0 | 0 | 55.6 | 35.4 | 0 | 0.9 |
| *Notropis rubellus* | 23 | 2.3 | 0.1 | 0 | 0 | 56.7 | 33.2 | 0 | 1.2 |
| *Notropis scabriceps* | 29 | 2.1 | 0.6 | 0 | 0 | 54.3 | 36.6 | 0 | 1.1 |
| *Notropis stilbius* | 33 | 2.9 | 0.8 | 3.1 | 0 | 53.1 | 34.2 | 0 | 1.2 |
| *Notropis texanus* | 21 | 5.6 | 1.9 | 19.2 | 0 | 61.7 | 10.2 | 0 | 0 |
| *Notropis uranoscopus* | 34 | 3.1 | 1.2 | 1.3 | 0 | 62.2 | 29.2 | 0 | 1.3 |
| *Notropis volucellus* | 22 | 5.8 | 4.3 | 2.9 | 0 | 69.9 | 16.7 | 0 | 0 |
| *Phenacobius catostomus* | 34 | 2.3 | 0.6 | 8.7 | 0.3 | 85.1 | 2.7 | 0 | 0 |
| *Phenacobius teretulus* | 15 | 34.5 | 6.8 | 0.8 | 1.4 | 48.7 | 0.4 | 0 | 0.4 |
| *Pimephales notatus* | 28 | 25.4 | 1.1 | 21.3 | 0.8 | 44.3 | 3.2 | 0 | 0.1 |
| *Pimephales vigilax* | 15 | 13.7 | 3.6 | 25.4 | 0.1 | 51.3 | 4.3 | 0 | 0 |
| *Rhinichthys atratulus* | 23 | 5.7 | 31.0 | 2.3 | 0 | 72.7 | 12.3 | 0 | 0 |
| *Rhinichthys cataractae* | 16 | 8.6 | 2.4 | 2.4 | 0.4 | 83.5 | 0.2 | 0 | 0.3 |

Table S5. Factor loadings for morphological variables. Note that only the first two axes were used in analyses in the paper.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | pPC1 (93.4%) | pPC2 (3.7%) | pPC3 (1.7%) | pPC4 (0.9%) |
| Head length | -0.982 | 0.093 | 0.087 | -0.089 |
| Head depth | -0.826 | -0.515 | 0.220 | -0.056 |
| Eye diameter | -0.983 | -0.021 | -0.159 | -0.083 |
| Snout length | -0.965 | 0.220 | 0.127 | 0.031 |
| Eye position | -0.983 | -0.087 | -0.061 | 0.148 |

Table S6. Factor loadings for dietary variables. Note that only the first two axes were used in analyses in the paper.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | pPC1 (87.5) | pPC2 (5.8%) | pPC3 (5.3%) | pPC4 (1.2%) |
| Algae | 0.992 | 0.121 | -0.023 | 0.009 |
| Vegetation | 0.185 | -0.065 | 0.398 | -0.895 |
| Sediment | -0.697 | -0.195 | 0.675 | 0.105 |
| Molluscs | -0.717 | -0.254 | 0.318 | 0.175 |
| Aquatic insects | -0.956 | 0.263 | -0.129 | -0.006 |
| Terrestrial insects | -0.104 | -0.767 | -0.626 | -0.011 |
| Crustaceans | -0.825 | -0.241 | 0.279 | 0.090 |
| Seeds | 0.019 | -0.637 | -0.503 | 0.150 |