

# Competition between Invasive Ruffe (*Gymnocephalus cernua*) and Native Yellow Perch (*Perca flavescens*) in Experimental Mesocosms

Raymond M. Newman <sup>1,\*</sup>, Fred G. Henson <sup>1,2</sup> and Carl Richards <sup>3</sup>

<sup>1</sup> Department of Fisheries, Wildlife and Conservation Biology, University of Minnesota, Saint Paul, MN 55108, USA; fred.henson@dec.ny.gov

<sup>2</sup> New York State Department of Environmental Conservation, Division of Fish and Wildlife, Albany, NY 12233-4753, USA

<sup>3</sup> Center for Water and the Environment, Natural Resources Research Institute, 5013 Miller Trunk Highway, Duluth, MN 55811, USA; crich555@gmail.com

\* Correspondence: RNewman@umn.edu

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**Table S1.** Initial (12-Sep) and final (24-Oct) mean individual live masses (g) and mean individual total lengths (TL mm) of perch in the 1996 mesocosm experiment. Replicates are designated A, B, C, and D. Treatments are designated HP=28 perch, HRP=14 perch and 14 ruffe, LP=14 perch, and LRP=7 perch and 7 ruffe.

	12-Sep	24-Oct	12-Sep	24-Oct
Treatment	Mass	Mass	TL	TL
AHP Average	15.9	15.7	116.0	117.0
AHRP Average	17.3	15.9	119.3	120.1
ALP Average	14.7	15.2	113.9	115.3
ALRP Average	16.2	22.6	115.9	123.0
BHP Average	15.4	15.3	115.4	115.8
BHRP Average	15.5	15.6	114.9	118.0
BLP Average	16.6	17.9	117.4	119.3
BLRP Average	17.5	15.9	120.1	117.7
CHP Average	15.5	15.3	115.7	116.6
CHRP Average	16.0	14.7	116.9	116.3
CLP Average	17.1	16.6	120.0	118.8
CLRP Average	16.8	14.8	117.9	115.3
DHP Average	15.9	14.5	116.3	116.2
DHRP Average	14.6	13.9	113.1	113.1
DLP Average	16.9	16.7	117.9	119.1
DLRP Average	15.5	14.6	114.0	117.5

**Table S2.** Initial (12-Sep) and final (24-Oct) mean individual live masses (g) and mean individual total lengths (TL mm) of ruffe in the 1996 mesocosm experiment. Blocks are designated A, B, C, and D. Treatments are designated HRP=14 ruffe and 14 perch and LRP=7 ruffe and 7 perch.

	<b>12-Sep</b>	<b>24-Oct</b>	<b>12-Sep</b>	<b>24-Oct</b>
Treatment	Mass	Mass	TL	TL
AHRP Average	96.3	99.9	10.6	10.0
ALRP Average	97.4	97.0	9.9	8.3
BHRP Average	102.5	104.7	11.6	11.4
BLRP Average	100.7	102.3	11.0	9.2
CHRP Average	98.6	99.6	11.2	9.8
CLRP Average	99.6	96.0	11.3	6.9
DHRP Average	97.9	97.9	10.1	8.7
DLRP Average	96.4	100.0	10.2	11.9

**Table S3.** Initial and final mean individual live masses (g) and mean individual total lengths (TL mm) of perch in the 1997 mesocosm experiment. Final means include replacement fish. The experiment consisted of two trials (two replicates at a time) and the relevant dates appear below. Treatment composition is given on the left P=perch and R=ruffe. Two treatments were improperly stocked as noted Wrong.

<b>Treatment</b>	<b>TL 11-Aug</b>	<b>Mass 11-Aug</b>	<b>TL 15-Sep</b>	<b>Mass 15-Sep</b>
0R,8P	94.8	8.8	100.0	11.9
0R,8P	87.7	6.6	90.0	7.3
8R,8P	106.8	12.6	109.3	12.7
8R,16P	102.9	12.1	105.4	11.8
4R,8P	103.5	12.6	102.8	11.4
8R,4P	119.0	18.5	118.8	17.2
8R,8P	99.6	9.3	103.8	9.5
16R,8P	94.4	8.2	95.5	7.7
8R,16P	102.9	11.5	109.0	12.6
4R,8P	95.4	8.7	96.3	7.8
8R,4P	96.8	8.9	102.0	9.1
16R,8P	107.4	14.2	106.8	12.8
<b>Treatment</b>	<b>TL 22-Sep</b>	<b>Mass 22-Sep</b>	<b>TL 28-Oct</b>	<b>Mass 28-Oct</b>
0R,8P	97.5	9.5	95.6	7.3
<i>Wrong</i>	101.6	10.3	102.3	9.0
8R,8P	101.3	10.3	98.3	7.7
8R,16P	101.3	10.4	103.2	10.1
<i>Wrong</i>	98.0	9.8	98.0	8.3
8R,4P	106.5	12.2	101.0	9.1
8R,8P	103.0	10.3	97.3	8.4
16R,8P	103.4	11.0	111.5	12.6
8R,16P	102.7	10.7	107.4	11.0
4R,8P	98.4	8.9	92.5	6.7
8R,4P	108.3	12.9	108.3	11.7
16R,8P	101.1	10.1	116.5	14.9

**Table S4.** Initial and final mean individual live masses (g) and mean individual total lengths (TL mm) of ruffe in the 1997 mesocosm experiment. Final means include replacement fish. The experiment consisted of two trials (two replicates at a time) and the relevant dates appear below. Treatment composition is given on the left P=perch and R=ruffe.

<b>Treatment</b>	<b>TL 11-Aug</b>	<b>Mass 11-Aug</b>	<b>TL 15-Sep</b>	<b>Mass 15-Sep</b>
8R,0P	86.8	6.4	94.3	8.8
4R,8P	82.8	5.6	90.5	8.2
8R,8P	92.6	7.7	97.5	9.9
8R,16P	94.9	8.2	101.0	10.3
8R,0P	91.9	7.4	95.4	8.3
8R,4P	90.4	7.5	91.8	8.3
8R,8P	92.5	7.6	95.5	8.5
16R,8P	91.1	7.1	94.5	7.5
8R,16P	93.6	7.9	97.8	9.9
4R,8P	91.0	6.9	98.0	8.5
8R,4P	94.1	7.8	97.3	9.1
16R,8P	94.8	7.8	94.9	8.2
<b>Treatment</b>	<b>TL 22-Sep</b>	<b>Mass 22-Sep</b>	<b>TL 28-Oct</b>	<b>Mass 28-Oct</b>
8R,0P	91.0	7.5	90.6	7.8
4R,8P	95.8	9.2	100.0	10.8
8R,8P	88.8	7.1	88.4	6.9
8R,16P	87.9	7.1	89.5	7.7
8R,0P	91.5	7.7	93.3	8.8
8R,4P	88.4	7.0	86.8	6.5
8R,8P	91.6	7.7	92.3	7.8
16R,8P	88.8	6.9	88.9	6.9
8R,16P	87.3	6.8	88.4	6.8
4R,8P	92.0	7.6	91.5	7.8
8R,4P	92.5	8.4	92.3	8.4
16R,8P	91.7	7.9	lost	lost

**Table S5.** Diet composition of ruffe and perch at the conclusion of the 1996 mesocosm experiment (10/24/96). Species and treatment are designated on the left. Replicates are designated A, B, C, and D. "M" represents the treatment mean. Treatments are designated HP=28 perch, HRP=14 perch and 14 ruffe, LP=14 perch, and LRP=7 perch and 7 ruffe. Mean individual stomach contents in milligrams dry mass for each taxonomic category appear in the columns from left to right as designated by the following codes: CHIR=chironomids, OSTR=ostracods, CERA=ceratopogonids, AMPH=amphipods, GAST=gastropods, CHAO=chaoborus, CLAD=cladocerans, COPE=copepods. No Ephemeroptera or Tricoptera were found.

Species	Treatment	CHIR	OSTR	CERA	AMPH	GAST	CHAO	CLAD	COPE	TOTAL
Perch	AHP	1.86	0.14	0.03	0.44	0.18	0.00	0.11	0.40	<b>3.14</b>
Perch	BHP	0.45	0.07	0.02	0.07	0.48	0.00	0.08	0.66	<b>1.84</b>
Perch	CHP	1.05	0.00	0.04	0.14	0.11	0.10	0.12	1.17	<b>2.73</b>
Perch	DHP	0.21	0.08	0.01	0.07	0.07	0.00	0.01	0.68	<b>1.13</b>
<b>Perch</b>	<b>MHP</b>	<b>0.89</b>	<b>0.07</b>	<b>0.02</b>	<b>0.18</b>	<b>0.21</b>	<b>0.03</b>	<b>0.08</b>	<b>0.73</b>	<b>2.21</b>
Perch	AHRP	0.63	0.00	0.00	0.01	1.05	0.00	0.57	0.55	<b>2.81</b>
Perch	BHRP	0.39	0.00	0.03	0.00	0.38	0.00	0.05	0.11	<b>0.95</b>
Perch	CHRP	0.02	0.00	0.00	0.07	0.59	0.00	0.00	0.04	<b>0.73</b>
Perch	DHRP	0.00	0.01	0.00	0.03	0.09	0.00	0.07	0.67	<b>0.87</b>
<b>Perch</b>	<b>MHRP</b>	<b>0.26</b>	<b>0.00</b>	<b>0.01</b>	<b>0.03</b>	<b>0.53</b>	<b>0.00</b>	<b>0.17</b>	<b>0.34</b>	<b>1.34</b>
Perch	ALP	2.16	0.15	0.08	0.18	0.16	0.00	0.19	0.18	<b>3.10</b>
Perch	BLP	0.49	0.00	0.07	0.01	0.14	0.40	0.34	0.22	<b>1.66</b>
Perch	CLP	1.50	0.91	0.09	0.26	0.18	0.18	0.01	0.07	<b>3.18</b>
Perch	DLP	0.47	0.33	0.00	0.02	0.00	0.00	0.01	0.82	<b>1.65</b>
<b>Perch</b>	<b>MLP</b>	<b>1.15</b>	<b>0.34</b>	<b>0.06</b>	<b>0.12</b>	<b>0.12</b>	<b>0.14</b>	<b>0.14</b>	<b>0.32</b>	<b>2.40</b>
Perch	ALRP	0.00	0.00	0.00	0.00	0.00	0.00	1.94	0.00	<b>1.94</b>
Perch	BLRP	1.17	0.00	0.06	0.92	0.47	0.00	0.08	0.01	<b>2.71</b>
Perch	CLRP	0.81	0.00	0.00	0.04	0.00	0.00	0.02	0.57	<b>1.44</b>
Perch	DLRP	0.39	0.00	0.00	0.12	0.00	0.00	0.00	0.01	<b>0.53</b>
<b>Perch</b>	<b>MLRP</b>	<b>0.59</b>	<b>0.00</b>	<b>0.01</b>	<b>0.27</b>	<b>0.12</b>	<b>0.00</b>	<b>0.51</b>	<b>0.15</b>	<b>1.65</b>
<b>Ruffe</b>	<b>AHRP</b>	<b>7.57</b>	<b>1.10</b>	<b>0.75</b>	<b>0.00</b>	<b>0.00</b>	<b>0.42</b>	<b>0.01</b>	<b>0.28</b>	<b>10.13</b>
Ruffe	BHRP	3.63	0.99	0.49	0.00	0.00	0.87	0.00	3.37	<b>9.35</b>
Ruffe	CHRP	3.16	0.83	0.54	0.19	0.00	0.40	0.00	0.12	<b>5.24</b>
Ruffe	DHRP	11.23	2.27	0.85	0.05	0.00	0.86	0.06	1.46	<b>16.77</b>
<b>Ruffe</b>	<b>MHRP</b>	<b>6.40</b>	<b>1.30</b>	<b>0.66</b>	<b>0.06</b>	<b>0.00</b>	<b>0.64</b>	<b>0.02</b>	<b>1.31</b>	<b>10.37</b>
Ruffe	ALRP	3.66	0.47	0.00	0.00	0.00	0.00	0.77	0.50	<b>5.40</b>
Ruffe	BLRP	12.01	5.73	0.60	0.00	0.00	0.78	0.00	0.28	<b>19.41</b>
Ruffe	CLRP	12.48	3.94	0.53	0.00	0.00	0.00	0.00	2.65	<b>19.60</b>
Ruffe	DLRP	12.22	1.69	0.75	0.00	0.00	0.41	0.01	0.47	<b>15.54</b>
<b>Ruffe</b>	<b>MLRP</b>	<b>10.09</b>	<b>2.96</b>	<b>0.47</b>	<b>0.00</b>	<b>0.00</b>	<b>0.30</b>	<b>0.19</b>	<b>0.97</b>	<b>14.99</b>

**Table S6.** Diet composition of ruffe and perch at the conclusion of the first trial of the 1997 mesocosm experiment. Species and treatment composition are designated on the left. Mean individual stomach contents in milligrams dry mass for each taxonomic category appear in the columns from left to right as designated by the following codes: CHIR=chironomids, OSTR=ostracods, CERA=ceratopogonids, GAST=gastropods, CLAM=bivalves, PUPA=includes insect pupae and unidentified winged hymenoptera, CHAO=chaoborus, CLAD=cladocerans, COPE=copepods. No Amphipods, Ephemeroptera, or Tricoptera were found.

<b>PERC H</b>	<b>CHI R</b>	<b>OSTR</b>	<b>CERA</b>	<b>GAST</b>	<b>CLAM</b>	<b>PUPA</b>	<b>CHA O</b>	<b>CLA D</b>	<b>COPE</b>	<b>TOTAL</b>
8P0R	5.24	0.35	0.59	0.00	0.38	0.00	0.00	0.50	0.12	<b>7.17</b>
8P0R	8.71	0.54	0.00	0.05	0.00	0.00	0.00	0.03	0.06	<b>9.39</b>
<b>mean</b>	<b>6.98</b>	<b>0.44</b>	<b>0.30</b>	<b>0.03</b>	<b>0.19</b>	<b>0.00</b>	<b>0.00</b>	<b>0.26</b>	<b>0.09</b>	<b>8.28</b>
8P4R	0.28	0.02	0.00	0.00	0.00	0.00	0.00	0.11	0.06	<b>0.48</b>
8P4R	0.60	0.00	0.00	0.00	0.00	0.02	0.00	0.08	0.20	<b>0.90</b>
<b>mean</b>	<b>0.44</b>	<b>0.01</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.01</b>	<b>0.00</b>	<b>0.09</b>	<b>0.13</b>	<b>0.69</b>
8P8R	5.04	0.19	0.04	0.00	0.00	0.00	0.00	0.15	0.14	<b>5.55</b>
8P8R	0.07	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	<b>0.17</b>
<b>mean</b>	<b>2.55</b>	<b>0.09</b>	<b>0.02</b>	<b>0.00</b>	<b>0.00</b>	<b>0.05</b>	<b>0.00</b>	<b>0.07</b>	<b>0.07</b>	<b>2.86</b>
8P16R	0.31	0.00	0.00	0.00	1.50	0.07	0.00	0.01	0.23	<b>2.12</b>
8P16R	2.02	0.00	0.00	0.00	0.19	0.00	0.00	0.04	0.18	<b>2.43</b>
<b>mean</b>	<b>1.17</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.84</b>	<b>0.03</b>	<b>0.00</b>	<b>0.03</b>	<b>0.20</b>	<b>2.27</b>
4P8R	1.75	0.00	0.03	0.00	0.00	0.03	0.00	0.06	0.03	<b>1.91</b>
4P8R	2.32	0.00	0.00	0.00	0.00	8.00	0.00	0.00	0.00	<b>10.32</b>
<b>mean</b>	<b>2.03</b>	<b>0.00</b>	<b>0.02</b>	<b>0.00</b>	<b>0.00</b>	<b>4.02</b>	<b>0.00</b>	<b>0.03</b>	<b>0.02</b>	<b>6.12</b>
16P8R	0.98	0.05	0.00	0.00	0.50	0.01	0.00	0.07	0.01	<b>1.62</b>
16P8R	1.50	0.05	0.03	0.03	0.14	0.01	0.00	0.04	0.52	<b>2.33</b>
<b>mean</b>	<b>1.24</b>	<b>0.05</b>	<b>0.02</b>	<b>0.02</b>	<b>0.32</b>	<b>0.01</b>	<b>0.00</b>	<b>0.06</b>	<b>0.27</b>	<b>1.98</b>

Table 6. continued.

RUFFE	CHI R	OSTR	CERA	GAST	CLAM	PUPA	CHA O	CLAD	COPE	TOTAL
8R0P	13.93	0.43	0.00	0.00	0.38	0.00	0.16	0.00	0.07	<b>14.97</b>
8R0P	2.90	0.05	0.00	0.00	0.38	0.00	0.00	0.00	0.00	<b>3.33</b>
<b>mean</b>	<b>8.41</b>	<b>0.24</b>	<b>0.00</b>	<b>0.00</b>	<b>0.38</b>	<b>0.00</b>	<b>0.08</b>	<b>0.00</b>	<b>0.04</b>	<b>9.15</b>
8R4P	5.87	0.43	0.23	0.00	0.38	0.00	0.00	0.00	0.06	<b>6.97</b>
8R4P	6.24	0.57	0.00	0.00	0.50	0.00	0.27	0.00	0.02	<b>7.62</b>
<b>mean</b>	<b>6.06</b>	<b>0.50</b>	<b>0.12</b>	<b>0.00</b>	<b>0.44</b>	<b>0.00</b>	<b>0.14</b>	<b>0.00</b>	<b>0.04</b>	<b>7.29</b>
8R8P	7.37	0.82	0.22	0.00	0.50	0.00	0.00	0.00	0.03	<b>8.94</b>
8R8P	0.99	0.14	0.17	0.00	0.00	0.00	0.00	0.00	0.06	<b>1.36</b>
<b>mean</b>	<b>4.18</b>	<b>0.48</b>	<b>0.19</b>	<b>0.00</b>	<b>0.25</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.05</b>	<b>5.15</b>
8R16P	11.39	0.32	0.03	0.00	0.00	0.00	0.00	0.00	0.18	<b>11.91</b>
8R16P	3.88	0.47	0.00	0.00	0.90	0.00	0.22	0.00	0.12	<b>5.59</b>
<b>mean</b>	<b>7.63</b>	<b>0.39</b>	<b>0.01</b>	<b>0.00</b>	<b>0.45</b>	<b>0.00</b>	<b>0.11</b>	<b>0.00</b>	<b>0.15</b>	<b>8.75</b>
4R8P	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	<b>0.07</b>
4R8P	2.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.01	<b>2.28</b>
<b>mean</b>	<b>1.03</b>	<b>0.13</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>1.17</b>
16R8P	3.41	0.25	0.00	0.00	0.68	0.00	0.00	0.00	0.08	<b>4.42</b>
16R8P	7.98	0.45	0.00	0.00	0.69	0.00	0.21	0.00	0.10	<b>9.44</b>
<b>mean</b>	<b>5.69</b>	<b>0.35</b>	<b>0.00</b>	<b>0.00</b>	<b>0.69</b>	<b>0.00</b>	<b>0.10</b>	<b>0.00</b>	<b>0.09</b>	<b>6.93</b>