Table 5. Decision rules for fish assemblages in rivers. Rules show the ranges of fuzzy membership functions (see Fig. 9). N shows the number of sites at the indicated BCG level and stream class in the calibration data set.

Metric	Prairie Rivers (1)	Northern Forest Rivers (4)		Wetland-Lacustrine (7)	
BCG Level 1	N=2	N=3		N=0[1]	
Total taxa	> 25 - 35	> 16 - 24		> 25 - 35	
Endemic taxa (Att 1)	Present	Present		Present	
Att 1+2 taxa	> 2 - 5	> 1 - 2		> 2 - 5	
Att 1+2+3 % taxa	> 45 - 55%	> 35 - 45%		> 45 - 55%	
Att 1+2+3 % ind	> 25 - 35%	> 45 - 55%		> 25 - 35%	
Att 5a or 6a Dominance		< 7 - 13%			
Tolerant % ind (5 + 5a + 6a)	< 3 - 7%			< 3 - 7%	
Highly tol % ind (5a + 6a)		< 7 - 13%			
BCG Level 2	N=6	N=15		N=7	
				Alt 1	**Alt 2**
Total taxa	> 16 - 24	> 6 - 10		> 6 - 10	> 11 - 16
Att 1+2 taxa	Present			Present	n/a
Att 1+2+3 % taxa	> 35 - 45%	> 25 - 35%		> 25 - 35%	= alt 1[2]
Att 1+2+3 % Ind	> 15 - 25%	> 25 - 35%		> 30 - 40%	= alt 1[2]
Att 5a or 6a Dominance		< 7 - 13%			
Highly tol % ind (5a + 6a)	< 7 - 13%	< 7 - 13%		< 7 - 13%	= alt 1[2]
BCG Level 3	N=25	N=11		N=7	
				Alt 1	**Alt 2**
Total taxa	> 11 - 16	> 6 - 10		> 1 - 5	> 6 - 10
Att 1+2+3 % taxa	> 15 - 25%	> 15 - 25%		> 10 - 20%	> 20 - 30%
Att 1+2+3 % Ind	> 7 - 13%	> 7 - 13%		> 10 - 20%	> 20 - 30%
Tol % ind (5 + 5a + 6a)		< 25 - 35%			
Att 5a or 6a Dominance	< 7 - 13%	< 10 - 20%			
Highly tol % ind (5a + 6a)	<25 - 35%			< 7 - 13%	<35 - 45%
BCG Level 4	N=31	N=16		N=11	
		Alt 1	**Alt 2**	**Alt 1**	**Alt 2**
Total taxa	> 11 - 16	> 6 - 10	= alt 1[2]	> 1 - 5	> 6 - 10
Att 1+2+3 % taxa	10 - 20%	> 15 - 25%	> 7 - 13%	present	> 7 - 13%
Att 1+ 2+3 % Ind	0 - 1%	> 3 - 7%	present	n/a	> 7 - 13%
1+2+3+4 % Ind				> 45 - 55%	n/a
Att 5a or 6a Dominance	<35 - 45%	< 25 - 35%	= alt 1[2]	< 35 - 45%	<45 - 55%
Tol % ind (5 + 5a + 6a)		n/a	< 30 - 40%		
Highly Tol % ind (5a + 6a)	<45 - 55%	< 35 - 45%	= alt 1[2]		
BCG Level 5	N=12	N=2		N=6	
Total taxa	> 11 - 16	6 - 10		>0 - 4	
Att 1+2+3+4 % Taxa				present	
Att 5a or 6a Dominance	<65 - 75%	<35 - 45%		<55 - 65%	
Highly tol % ind (5a + 6a)		<55 - 65%			
BCG Level 6 (no rules)	N=1	N=0		N=2	

[1] **BCG Level 1 for Wetland-lacustrine (shaded) set to same criteria as Prairie Rivers.**

[2] "= alt 1" the rule is the same as given under Alt 1 for this metric

Table 6. Decision rules for fish assemblages in wadeable streams, as in Table 5.

Metric	Southern Wadeable Streams (2)			Northern Wadeable Streams (5)	
BCG Level 1	N=0[1]			N=0[1]	
total taxa	> 25 - 35			> 25 - 35	
1 Endemic taxa	present			present	
Att 1+2 taxa	>2 - 5			>2 - 5	
att 1+2+3 % taxa	> 45 - 55%			> 45 - 55%	
att 1+2+3 % Ind	> 25 - 35%			> 25 - 35%	
Tol % ind (5 + 5a + 6a)	< 3 - 7%			< 3 - 7%	
BCG Level 2	N=1			N=8	
total taxa	> 16 - 24			>11 - 16	
att 1+2+3 total taxa	> 6 - 10				
att 1+2+3 % taxa	> 35 - 45%			> 25 - 35%	
att 1+2+3 % Ind	> 7 - 13%			> 7 - 13%	
att 5a or 6a dom				< 7 - 13%	
Tol % ind (5 + 5a + 6a)				< 30 - 40%	
Highly tol % ind (5a + 6a)	< 15 - 25%				
BCG Level 3	N=4			N=10	
total taxa	>11 - 16			> 11 - 16	
att 1+2+3 % taxa	> 7 - 13%			> 20 - 30%	
att 1+2+3 % Ind	> 3 - 7%			> 3 - 7%	
att 5a or 6a dom	< 15 - 25%			< 7 - 13%	
Highly tol % ind (5a + 6a)	< 35 - 45%			< 15 - 25%	
BCG Level 4	N=10			N=15	
	Alt 1	**Alt 2**		**Alt 1**	**Alt 2**
total taxa	> 6 - 10	> 16 - 24		> 6 - 10	= alt 1[2]
att 1+2+3 % taxa	0 - 1%	n/a		> 3 - 7%	n/a
att 1+ 2+3 % Ind	0 - 1%	n/a		present	n/a
1+2+3+4 % Ind				n/a	> 65 - 75%
att 1+2+3+4 % taxa				n/a	> 45 - 55%
att 5a or 6a dom	< 45 - 55%	= alt 1[2]		< 25 - 35%	< 15 - 25%
Tol % ind (5 + 5a + 6a)	<65 - 75%	= alt 1[2]			
Highly tol % ind (5a + 6a)	<55 - 65%	= alt 1[2]		<55 - 65%	n/a
BCG Level 5	N=18			N=4	
	Alt 1	**Alt 2**	**Alt 3**		
total taxa	> 3 - 7	> 11 - 16	> 16 - 24	>1 - 5	
att 1+2+3 % Taxa	n/a	present	n/a		
att 1+2+3+4 % Taxa	> 7 - 13%	n/a	> 15 - 25%	> 10 - 20%	
att 5a or 6a dom	< 45 - 55%	n/a	n/a	< 65 - 75%	
Highly tol % ind (5a + 6a)	< 65 - 75%	n/a	n/a		
BCG Level 6 (no rules)	N=2			N=0	

[1] **BCG Level 1 (shaded) set to same criteria as Prairie Rivers, Table 4-1.**

[2] "= alt 1" the rule is the same as given under Alt 1 for this metric

Table 7. Decision rules for fish assemblages in headwater streams, as in Table 5.

Metric	Southern Headwaters (3)		Northern Headwaters (6)		
BCG Level 1	N=0[1]		N=0[1]		
total taxa	> 25 - 35		> 25 - 35		
1 Endemic taxa	present		present		
Att 1+2 taxa	>2 - 5		>2 - 5		
att 1+2+3 % taxa	> 45 - 55%		> 45 - 55%		
att 1+2+3 % Ind	> 25 - 35%		> 25 - 35%		
Tol % ind (5 + 5a + 6a)	< 3 - 7%		< 3 - 7%		
BCG Level 2	N=0		N=4		
total taxa	> 6 - 10		> 6 - 10		
att 1+2+3 total taxa	> 0 - 4		> 1 - 4		
att 1+2+3 % taxa	>15 - 25%		>15 - 25%		
att 1+2+3 % Ind	> 15 - 25%		> 15 - 25%		
att 5a or 6a dom	< 3 - 7%		< 3 - 7%		
Highly tol % ind (5a + 6a)	< 7 - 13%		< 7 - 13%		
BCG Level 3	N=3		N=9		
total taxa	> 5 - 9		> 3 - 7		
att 1+2+3 % taxa	present		> 10 - 20%		
att 1+2+3 % Ind			> 7 - 13%		
att 1+2+3+4 % taxa	15 - 25%				
att 5a or 6a dom	< 3 - 7%		< 25 - 35%		
Highly tol % ind (5a + 6a)	< 7 - 13%		< 25 - 35%		
BCG Level 4	N=22		N=10		
	Alt 1	**Alt 2**	**Alt 1**	**Alt 2**	**Alt 3**
total taxa	> 4 - 8	= alt 1[2]	> 6 - 10	> 2 - 5	present
att 1+2+3 % taxa	n/a	present	> 7 - 13%	= alt 1[2]	= alt 1[2]
att 1+ 2+3 % Ind			> 3 - 7%	= alt 1[2]	= alt 1[2]
att 1+2+3+4 % taxa	> 7 - 13%	= alt 1[2]			
att 5a or 6a dom	< 45 - 55%	n/a	< 35 - 45%	<25 - 35%	absent
Highly tol % ind (5a + 6a)					
BCG Level 5	N=4		N=8		
total taxa	> 1 - 5		> 0 - 4		
att 1+2+3+4 % Taxa			> 7 - 13%		
att 5a or 6a dom	< 65 - 75%				
BCG Level 6 (no rules)	N=3		N=0		

[1] BCG Level 1 for Wetland-lacustrine (shaded) set to same criteria as Prairie Rivers.

[2] "= alt 1" the rule is the same as given under Alt 1 for this metric

Table 8. Decision rules for fish assemblages in southern coldwater streams (Driftless area in MN). Modified from Gerritsen and Stamp (2013). Numbers (N) include sites in Wisconsin and Michigan.

Metric	**Southern Coldwater (10)**			
BCG Level 1	N=4			
	Brook Trout native		**Brook trout not native**	
Total taxa	< 2 - 5		= alt 1[1]	
Brook trout	present		absent	
Att 1+2 taxa	0 - 1		= alt 1[1]	
Att 1+2+3 % taxa	> 45 - 55%		= alt 1[1]	
Att 1+2+3 % Ind	> 55 - 65%		= alt 1[1]	
Other Salmonidae (nonnative)	absent		= alt 1[1]	
Tolerant% ind (5 + 5a + 6a)	< 3 - 7%		= alt 1[1]	
BCG Level 2	N=9			
	Brook Trout native		**Brook trout not native**	
	Alt 1	**Alt 2**	**Alt 1**	**Alt 2**
Total taxa (by area)	if area < 10, (< 6-10), else (> 2-5 AND < 11-16)			
Brook trout % ind	present	= alt 1[1]	n/a	n/a
Att 1+2+3 % taxa	> 35 - 45%	> 15 - 25%	n/a	> 15 - 25%
Att 1+2+3+6 % Ind	n/a	n/a	> 65 - 75%	n/a
BT % of total Salmonidae	> 35 - 45%	= alt 1[1]	n/a	n/a
Tolerant% ind (5 + 5a + 6a)	< 7 - 13%	< 0 - 1%	n/a	< 7 - 13%
BCG Level 3	N=17; BT status not relevant for Levels 3 - 6			
	Alt 1		**Alt 2**	
Number individuals (by area)				
Att 1+2 taxa	n/a		0 - 1	
sensitive + Salmonidae % taxa	20 - 30%		= alt 1[1]	
sensitive + Salmonidae % Ind	15 - 25%		= alt 1[1]	
BT + Att 6 % ind (all trout)	0 - 1%		= alt 1[1]	
Att 4-5 dom	< 45 - 55%		= alt 1[1]	
Tolerant% ind (5 + 5a + 6a)	< 7 - 13%		< 35 - 45%	
BCG Level 4	N=9			
Att 1+2+3+6 % taxa	3 - 7%			
Att 1+2+3+6 % Ind	3 - 7%			
% Taxa (5 + 5a + 6a)	< 40 - 50%			
Highly Tolerant % ind (5a + 6a)	< 7 - 13%			
BCG Level 5	N=8			
Total taxa	> 1 - 4			
Att 1+2+3+4 % Taxa	> 7 - 13%			
BCG Level 6 (no rules)	N=0			

[1] **"= alt 1": the rule is the same as given under Alt 1 for this metric**

Table 9. Decision rules for fish assemblages in northern cold-cool water streams. Modified from Gerritsen and Stamp (2011). Numbers (N) include sites in Wisconsin and Michigan.

Metric	**Northern Cold-cool (11)**	
	N=0	
BCG Level 1	**Brook Trout native**	**Brook trout not native**
Total taxa	> 2 - 5 and < 11 - 16	= alt 1[1]
Brook trout	present	absent
Att 1+2 taxa	0 - 1	= alt 1[1]
Att 1+2+3 % taxa	> 35 - 45%	= alt 1[1]
Att 1+2+3 % Ind	> 35 - 45%	= alt 1[1]
Other Salmonidae (nonnative)	absent	= alt 1[1]
Tolerant % ind (5 + 5a + 6a)	< 3 - 7%	= alt 1[1]
BCG Level 2	N=14	
total taxa (by area)	< 16 - 24	= alt 1[1]
Brook trout % ind	present	n/a
Att 1+2 taxa	0 - 1	n/a
Att 1+2+3 % taxa	> 25 - 35%	= alt 1[1]
Att 1+2+3 % Ind	> 17 - 27%	= alt 1[1]
BT % of total Salmonidae	> 35 - 45%	n/a
Tolerant % ind (5 + 5a + 6a)	<15 - 25%	= alt 1[1]
BCG Level 3	N=13; BT status not relevant for Levels 3 - 6	
	Alt 1	**Alt 2**
Number individuals (by area)		
Total taxa	<16 - 24	= alt 1[1]
Sensitive + Salmonidae % taxa	Sensitive + Salmonidae % taxa > tolerant % taxa (Att 5, 5a, 6a)	n/a
Sensitive + Salmonidae % Ind	n/a	Sensitive + Salmonidae % ind > tolerant % ind (Att 5, 5a, 6a)
Att 4-5 dom	IF area > 5, THEN < 60 - 70	= alt 1[1]
Tolerant% ind (5 + 5a + 6a)		
Highly tolerant % ind (5a + 6a)	<3 - 7%	= alt 1[1]
BCG Level 4	N=9	
Att 1+2+3+6 % taxa	> 3 - 7%	
Highly Tolerant % ind (5a + 6a)	< 15 - 25%	
BCG Level 5	N=6	
Total taxa	> 1 - 4	
Att 1+2+3+4 % Taxa	> 7 - 13%	
BCG Level 6 (no rules)	N=0	

[2] "= alt 1" the rule is the same as given under Alt 1 for this metric