

THE STUDY STREAMS

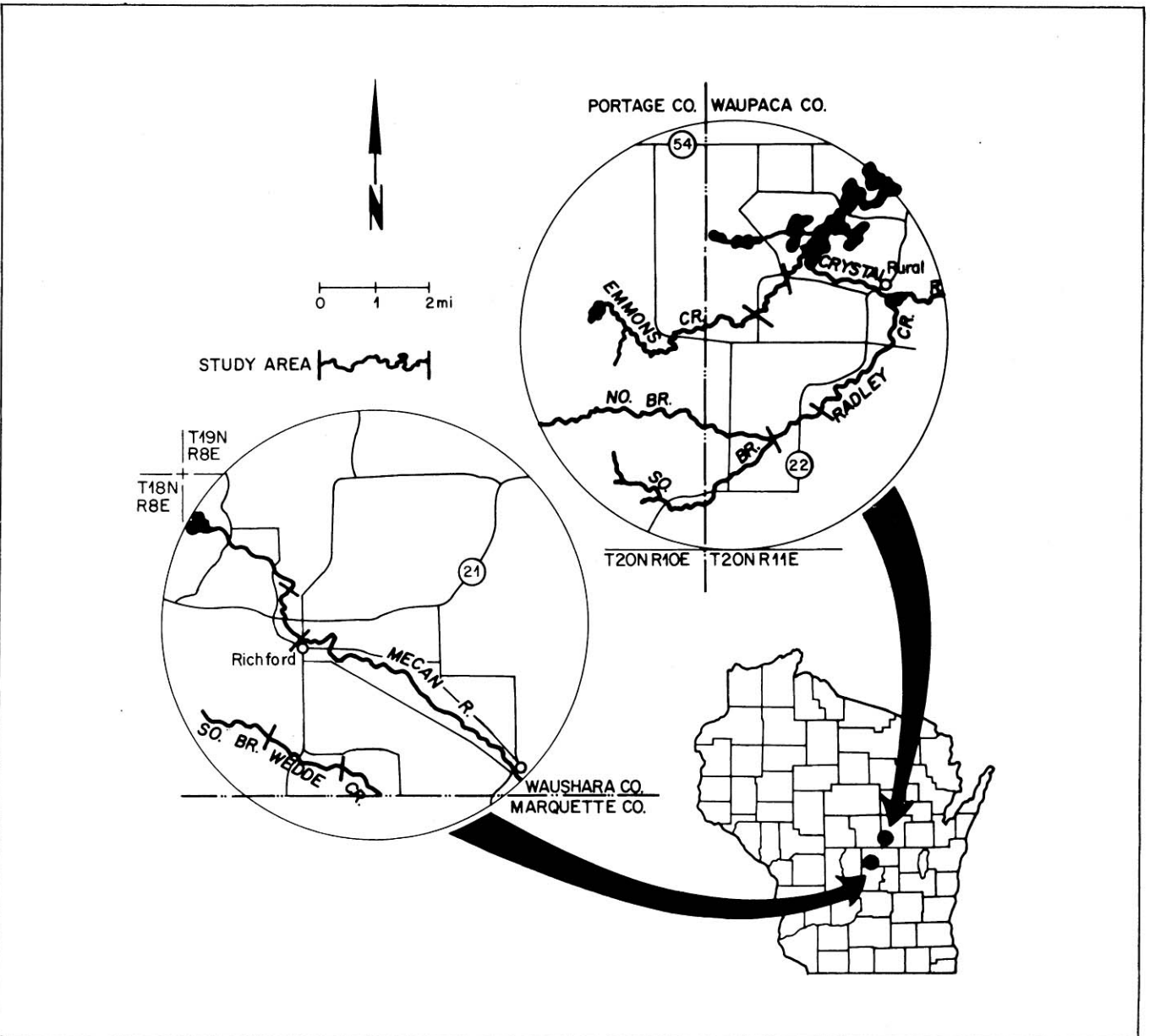
The four study streams were Emmons Creek, Radley Creek, the Mekan River, and the South Branch of Wedde Creek (Fig. 1). Emmons Creek originates from Fountain Lake in southeastern Portage County and flows 6.0 miles before entering Waupaca County's 724-acre Chain O'Lakes. Radley Creek originates 3.0 miles south of Emmons Creek and flows 11.0 miles (including South Branch) into the Crystal River near Rural. Approximately 35 miles south-

west of Radley Creek, the Mekan River originates from Mekan Springs in southwestern Waushara County and flows 31 miles before emptying into the Fox River in Marquette County. The South Branch of Wedde Creek originates 4.0 miles south of the Mekan River and flows 4.9 miles before merging with the North Branch to form Wedde Creek. All of Emmons and Radley creeks, the South Branch of Wedde Creek, and the upper 6.6 miles of the Mekan River are Class I trout

water. All four streams were once native brook trout streams but now support primarily brown trout. The Mekan River also contains a small but self-sustaining population of rainbow trout (*Salmo gairdneri*).

Study zones on the four streams ranged in length from 1.1 to 1.5 miles and were easily accessible to anglers through state-owned public fishing areas. The Mekan River and Emmons Creek are the two largest streams with average widths of approximately 22

FIGURE 1. Location of the four wild brown trout study streams in central Wisconsin and their respective study zones.



and 19 ft, respectively, and average discharges near 22 cfs (Table 1). Radley Creek is narrower and deeper than either Emmons Creek or the Mecan River and has a 20% smaller volume. The South Branch of Wedde Creek (referred to hereafter as just "Wedde Creek") is the smallest stream, with an average discharge of 9 cfs and an average width of 12 ft. Pools more than 3.5 ft deep are uncommon in the four streams and stream gradients are less than 15 ft/mile.

Total alkalinities (CaCO₃) within the study zones ranged from 131 to 186 ppm, conductivities ranged from 276 to 356 mhos/cm² (Table 2), and pH ranged from 7.5 to 8.2. Stream temperatures from mid-June through mid-September ranged from the low 50's to the low 60's F in Emmons and Radley creeks with maximum temperatures rarely attaining 65 F (Fig. 10). Temperatures were similar in Wedde Creek with the exception that maximum temperatures were commonly in the mid-60's. The Mecan River was the warmest of the four streams with summer temperatures reaching the mid-70's F. Portions of all four streams remain ice free even during severe winters. Minimum winter temperatures generally hovered between 33 and 34 F on all but the Mecan River, where they approached 32 F.

Some trout habitat improvement work had been done in the study zones of all the study streams except Emmons Creek prior to this investigation. Substrates consisted primarily of fine sand with gravel riffles occurring frequently in Emmons Creek and the Mecan River and occasionally in Radley and Wedde creeks. Aquatic vegetation ranged from sparse in Emmons Creek, Radley Creek, and the Mecan River to moderately abundant in Wedde Creek and consisted primarily of watercress (*Nasturtium officinale*) and water buttercup (*Ranunculus*

TABLE 1. Physical characteristics of the four central Wisconsin brown trout study streams measured within their respective study zones.

Stream	Study Zone Length (miles)	Surface Area (acres)	Average Width (ft)	Average Depth (ft)	Average Discharge (cfs)
Emmons Creek	1.3	3.1	18.9	1.1	21.8
Radley Creek	1.5	3.1	16.7	1.2	17.0
South Branch Wedde Creek	1.1	1.6	12.3	1.1	8.8
Mecan River	1.4	3.7	21.5	0.9	21.6

TABLE 2. Chemical parameters determined from quarterly water samples from four central Wisconsin brown trout streams in 1976-77.

Parameter*	Emmons Creek	Mecan River	S. Br. Wedde Creek	Radley Creek
pH	7.9-8.2	7.6-8.0	7.6-7.9	7.5-8.0
Conductivity	320-355	330-356	276-319	288-339
Alkalinity	161-186	160-170	131-147	135-157
N (tot)	1.88-2.47	1.93-2.13	1.48-2.79	2.24-2.33
P (tot)	0.03-0.07	0.01-0.08	0.03-0.05	<0.01-0.05
Ca	36-40	26-42	25-35	33-40
Mg	23-28	24-28	19-24	21-24
Na	2-8	<1-7	<1-18	<1-26
K	<0.5-1.6	0.5-1.4	<0.5-1.4	<0.5-3.4
Fe	<0.09-0.40	<0.09-0.55	0.13-0.19	<0.09-0.14
Mn	<0.03-0.14	<0.03-0.05	<0.03-0.06	<0.03-0.06
SO ₄	5-8	5-8	4-9	6-9
Cl	2-4	2-4	2-4	3-4
Turbidity	0.05-2.0	1.0-7.0	0.06-2.5	0.03-6.0

*Measurements are mg/l except for the following parameters: pH: units; conductivity: micromhos/cm² at 25 C; alkalinity: mg/l CaCO₃; and turbidity: FTU.

sp.). The food base for trout consisted primarily of aquatic and terrestrial invertebrates.

Most of the nontrout fishes were mottled sculpin (*Cottus bairdi*) and

brook stickleback (*Culaea inconstans*) but neither fish was particularly abundant. A sparse crayfish population was also present in the Mecan River.