

UPPER RABBIT RIVER

*Allegan County (T4N, R11W. Sections 25, 31, 32, 35, 36)
(T3N, R11W. Sections 1, 2, 3, 4, 9, 10; T3N, R12W, Sections 1, 2, 10, 11)
Surveyed August 1-4, 1989*

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Environment

The upper portion of the Rabbit River is a second order stream rated as second quality coldwater. Located in northeastern Allegan County, the designated trout stream portion of the Rabbit River ends at U.S. Route 131 (US 131). The Rabbit River flows through the City of Hopkins. Originating in springs in the farmland of Leighton Township, and as outlets in a couple of very small lakes, the stream flows in a westerly direction and eventually empties into the lower Kalamazoo River. Most areas of the Rabbit River below US 131 have not been surveyed yet. A rotenone survey of those waters is planned for the near future.

The watershed of the upper Rabbit River is primarily farmland and some woodlots. Soils in the drainage include poorly drained Granby and Glendora loamy sands, and very poorly drained Adrian and Houghton mucks.

The upper Rabbit River is approximately 9.8 miles in length. The average width is 14 feet, with depths averaging 1.5 feet. Water velocities range from fast to slow. On average, substrates are composed of sand (60%), silt (20%), gravel (10%), rock (5%), and clay (5%). Only three of seven stations above US 131 contained enough gravel areas (greater than 3%, Raleigh et al. 1986) to support favorable salmonid spawning conditions.

Depending on the section surveyed, overall habitat varies from poor to excellent. Undercut banks and brush are common in most sections, while the occasional log and pool is also found. Watercress is common only to the extreme headwater areas. Duning of sand appears common, indicative of a heavy moving bedload. Chemical characteristics that have been studied include pH (7.4-8.6), dissolved oxygen (greater than 5.0 ppm in August), and DDT concentrations (not detectable in sampling from 1964).

After a fish kill in July 1989, the Surface Water Quality Division (SWQD) conducted a biological survey of the river, with specific sampling conducted both above and below 135th Avenue. The area above 135th Avenue was the site of the chemical contamination causing the fish kill.

Alkalinities at this time ranged from 188 to 234 ppm. Many other chemical characteristics were

also analyzed. The results are available in a report issued by the Michigan Department of Natural Resources, Surface Water Quality Division (1990).

The macroinvertebrate communities were qualitatively sampled at four locations in the upper Rabbit River (also by SWQD for the same biological survey). Up to 24 species, including mayflies and caddisflies, were documented. Many of the species can be classified as intolerant, meaning they succumb easily to polluted waters.

There is no state-owned land along the banks of the upper Rabbit River. However, access is good at most road crossings, and landowner permission is easily obtained.

Fishery Resource

The Rabbit River has been actively managed for trout since at least 1939. Brown trout yearlings were (and still are) planted annually. Stocking rates today are about 225 per acre. Steelhead stocking in the lower Rabbit River started in the mid-1970s and continues today, averaging 7,000 spring yearlings. Steelhead migrate up into the designated trout stream area and spawn in available habitat. Some natural reproduction of steelhead has been noted in past surveys.

The upper Rabbit River has historically been popular with trout anglers, primarily upstream of Wayland. Historical records also indicate that northern pike and both largemouth and smallmouth bass were popular gamefish, especially in the lower reaches. Other than the addition of trout to the fish community, there is no evidence of change in the community composition of today compared to 50 years ago.

The headwater area above 135th Avenue was designated as a county drain in 1926 (Hooker-Harvey, by name). This designation has caused many fishery management problems for the upper Rabbit River. Dredging activities and the opening of several large springs by dredging have substantially increased sediment loads in the river. Mitigation measures, including sediment basins, have been installed. In 1983, an attempt was made to extend the county drain designation from 135th Avenue downstream to 6th Street. This attempt was overwhelmingly opposed by the public and defeated through court action.

In April of 1971, an extensive stream electroshocking survey found low trout numbers and high numbers of competing species. A chemical reclamation project in May of 1971 removed fish from 4th Street to US 131. Brown trout were restocked, along with smallmouth bass below Hopkins. No chemical treatments have occurred since 1971.

The trout fishery of today is only a remnant of what it was prior to a fish kill that occurred on July 16, 1989. A crop-dusting helicopter sprayed the insecticide Endosulfan on celery fields between 135th and 137th avenues. The landowner also apparently dredged the river without the proper DNR permits just prior to spraying, probably destroying beds of watercress. The river in this area typically is full of watercress, which most likely held back runoff previously. Without the watercress, the Endosulfan freely entered and flowed unimpeded down the watercourse. Sampling by SWQD within 1 month of the fish kill found Endosulfan concentrations in the sediments as high as 120 PPB. Contaminant samples of trout also revealed high concentrations of Endosulfan in the fish.

An extensive fishery survey was conducted within 3 weeks of the fish kill to assess the damage.

Based on previous surveys (notably the 1983 population estimates) it was felt that the effects of the fish kill went as far as 5th Street, at least for trout. Brown trout up to 23 inches were found dead in this stretch. Other species did not appear as affected this far down, as they were found in similar numbers as in previous surveys.

The 1989 fish community was still quite varied (Table 1). A total of 16 species of fish were collected in the designated trout stream portion of the Rabbit River. But, only five (5) brown trout, 7 to 15 inches long, were collected.

Compared with the 1983 survey (Table 2) many more species are present today than then. This may be due in part, however, to the better equipment available for collecting fish. Population estimates in 1983 revealed that brown trout were by far the most abundant species found. Estimates of brown trout populations in 1983 between 135th Avenue and 4th Street ranged from 43 to 170 pounds per acre (rivaling Blue Ribbon trout streams in Region II). The trout population in the effected area of chemical contamination was, for all practical purposes, wiped out. The majority of the trout production in this area was natural.

In July 1990, three sections of the upper Rabbit were surveyed because of concern voiced by the U. S. Fish and Wildlife Service (USFWS) over lack of fish and lamprey ammocetes in their electrofishing stations below Wayland. Backpack electroshocking was conducted by our crew at 135th Avenue, 4th Street, and 8th Street. The trout population appears to be rebuilding itself well. Many trout were taken above 4th Street, with a considerable percentage of those trout appearing to be wild fish. I believe larger trout moved up the system last fall, and spawned successfully. At least six young-of-the-year brown trout were captured that were not of hatchery origin. It turned out the USFWS equipment was faulty.

Because of the fish kill, it will be 2 to 4 years before the trout population can be restored. In recent years the area between 135th Avenue and 4th Street has become quite popular for catching 20-inch plus brown trout. A 7¼ pound brown trout was caught in this section in June 1985. A restocking regime was developed specifically for rebuilding the lost population to 1983 population structures. Stocking rates were developed assuming 50% mortality rates per year, per year class. Further information can be found in the documents listed at the end of the report. The upper Rabbit River must be restored to its previous condition. No other trout waters in District 12, or perhaps Region III, rivaled the trout production of some sections of the Rabbit River.

Management Direction

The upper Rabbit River should continue to be managed as a second quality coldwater stream. The trout fishery should be restored in the near future to its previous level of production. Chemical reclamation of the river was considered after the fish kill, but it was felt that the Endosulfan probably did a good enough job at removing a significant portion of fish biomass that it was not needed. The many points of fish species contamination (lake outlets) will always be a problem, and chemical reclamation of the river will most likely be needed within the next decade.

Habitat restoration at present is not prudent, as perhaps the best technique for rehabilitating the Rabbit River would be numerous sediment basins to remove the existing (and increasing) sand

bedload. At present there are two sediment basins upstream of 135th Avenue. An agreement exists with the county to clean one basin and a private farmer keeps the second one clean. More sediment basins are needed. The feasibility of more basins needs to be studied in depth. Much of the sand bedload is coming from the Hooker-Harvey Drain, and we have no control over what happens up there. The fact that the headwaters are designated county drain, and that nothing below that is, will continue to create fish management problems for the river.

The opportunity exists now to greatly improve the fishery, but only because of an unfortunate fish kill. The section between 135th Avenue and 4th Street has good gradient, excellent habitat and bottom substrate. There is no reason to believe that this area will not return to its original state.

Hopefully, production of wild brown trout in this area will be high enough so that migration downstream can seed areas that we are presently stocked yearly. If funding becomes available in the future for habitat restoration, it is recommended that a complete survey of the bottom substrate be made so that the feasibility of sand traps can be determined and weighed against the possible benefits.

One other potential obstacle to improving the fishery beyond what it was, may be the continued runs of steelhead up into the headwaters. Research in Michigan has suggested that rainbow trout may compete with brown trout (Ziegler 1988).

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References

Quinn, D. 1990. Staff Report Biological Surveys of the Rabbit River in an agricultural area east of the town of Wayland, Allegan County, Michigan, July 11-18, 1989; August 8, 1989; October 11, 1989. Michigan Department of Natural Resources, Surface Water Quality Division, MI/DNR/SWQ-90/100, Lansing.

Raleigh, R. F., L. D. Zuckerman, and P. C. Nelson. 1986. Habitat suitability index models and instream flow suitability curves: Brown trout, revised. U. S. Fish and Wildlife Service Biological Report 82(10.124).

Ziegler, R. L. 1988. Stream Resource Utilization of Sympatric and allopatric juvenile brown (*Salmo trutta*) and Steelhead trout (*Salmo gairdneri*). Michigan Department of Natural Resources, Fisheries Research Report 1957, Ann Arbor.

Table 1.-Species, relative abundance, and length of fishes collected at nine stations on the upper Rabbit River, August 1-4, 1989.

Species	Number	Percent	Length range (inches) ¹
Green sunfish	45	21.4	1-4
Central mudminnow	43	20.5	1-4
Creek chub	20	9.5	2-6
Bluntnose minnow	20	9.5	1-2
White sucker	13	6.2	2-15
Common shiner	11	5.2	4-7
American brook lamprey	10	4.7	5-7
Bluegill	10	4.7	1-3
Northern hogsucker	9	4.3	3-10
Pumpkinseed	8	3.8	2-5
Johnny darter	8	3.8	1-2
Brown trout	5	2.4	7-15
Grass pickerel	3	1.5	5-7
Stonecat	2	1.0	3-4
Hornyhead chub	2	1.0	4-6
Rock bass	6	0.5	5-6
Total	210	100.0	

¹Fish were measured to inch group: e.g., "1" = 1.0 to 1.9 inches; "2" = 2.0 to 2.9 inches; etc.

Table 2.-Species and relative abundance of fishes collected by number at four stations on the upper Rabbit River, 1983.

Species	Number	Percent	Length range (inches) ¹
Brown trout	148	77.9	1-22
White sucker	25	13.2	4-14
Central mudminnow	6	3.2	2-3
Creek chub	3	1.6	3-6
Grass pickerel	3	1.6	3-9
Rainbow trout	2	1.0	4-8
Bluegill	1	0.5	4
Northern hogsucker		0.5	7
Total	188		

¹Fish were measured to inch group: e.g., "1" = 1.0 to 1.9 inches; "2" = 2.0 to 2.9 inches; etc.

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