Deer Creek

Charlevoix County, Township 32 North, Range 6 West, Sections 24-30
Jordan River Watershed

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Environment

Deer Creek is a small (12-15 ft wide), 9.6-mile-long tributary stream of the Jordan River in Charlevoix County. It originates as the outflow of Deer Lake, a 463-acre, shallow lake with a warmwater fish community. A small (2-ft head) lake-level control structure at Deer Lake affects the flow of Deer Creek, and prevents most upstream fish passage into Deer Lake. Further information on the control structure is available in Hay and Meriwether (2004a). Deer Creek has another dam on it about one mile upstream of its confluence with the Jordan River. This dam creates an impoundment called Patricia Lake. The dam at Patricia Lake was originally built in 1891 as a gristmill, was converted to a hydroelectric facility in 1903, and was decommissioned in 1950. Currently, it has a 13-ft head, and impounds about 46 acres of water (Breck 2004) which is used for non-contact cooling in a manufacturing process. Discharge water from the manufacturing plant is 61°F (Hay and Meriwether 2004a). The dam blocks fish migrations, including sea lamprey and potamodromous fishes such as steelhead, salmon, trout, and walleye.

Deer Creek flows entirely through private land, draining an extensive lowland swamp-conifer forest. Major tributaries are Collins, Warner, Eaton, and Marion creeks, which are all Designated Trout Streams and are similar to the upper reaches of Deer Creek. The geology in the vicinity of Deer Creek is comprised of outwash sand and gravel, coarse glacial till, and lacustrine sand and gravel (Hay and Meriwether 2004a). Land cover includes forested and agricultural lands with some residential and light industrial land in the lower reaches. The substrate of Deer Creek is dominated by sand, though gravel is present in relatively low abundance throughout the creek. Deer Creek has groundwater influx and cold summer temperatures, except for below the Patricia Lake Dam. The upper section of Deer Creek downstream to Patricia Lake has a gradient of 7.1 ft/mile, with pool and riffle habitat. Angling is reported to be good for brook and brown trout, though public access is limited to road crossings. The lower section from Fuller Road to the confluence with the Jordan River has a gradient of 19.8 ft/mile, which is where the Patricia Lake dam was constructed. In August of 1997, the flow of Deer Creek at highway M-32 was measured at 29.4 cubic feet per second.

History

Information on the aquatic community of Deer Creek is minimal and most available information was recently summarized by Hay and Meriwether (2004a) in the Jordan River Assessment. This report for Deer Creek largely draws from that document. In 1889, brown trout were stocked in an inlet to Deer Lake, after which they likely spread to Deer Creek and the Jordan River. Additionally, from 1934 to 1965 either brook, brown, or rainbow trout were stocked annually in Deer Creek. Since 1965, no fish have been stocked in Deer Creek. The earliest surveys on Deer Creek were creel surveys, which occurred sporadically from 1928 through 1963 (Hay and Meriwether 2004b). Angler catches

demonstrated that Deer Creek provided a coldwater fishery from the 1920s through the 1960s. In 1990, the MDNR, Surface Water Quality Division collected 48 fish from Deer, Warner, Collins, and Eaton creeks, including brown trout, brook trout, bluntnose minnow, blacknose dace, brook stickleback, creek chub, mottled sculpin, rock bass, and common white sucker (Anonymous 1992). Although creel survey data are not available for Patricia Lake, anglers report that trout and coolwater species are present in the impoundment. Below the impoundment, Deer Creek produces opportunities for anglers to catch steelhead in the spring and salmon in the fall, though the impoundment warms the water during the summer, allowing the presence of warmwater species. Deer Creek below the impoundment is also a large producer of sea lampreys, with a predicted annual production of 3,633 transformers (E. Koon, United States Fish and Wildlife Service, personal communication). In 2002, 111 adult sea lampreys were collected in traps below the dam and the estimated number of adult sea lampreys in Deer Creek was 313. In addition to the trapping, the USFWS chemically treats the lower section of Deer Creek to eradicate sea lamprey ammocoetes.

Patricia Lake was surveyed using electrofishing gear in 2006 by the MDNR (Kalish 2007a). The fish community was dominated by white suckers, with yellow perch, bluegill, largemouth bass, rock bass, brown and black bullheads, and northern pike also present in relatively low abundance. Kalish (2007a) described the fish community as having low age-class diversity, low overall abundance, and limited species richness. He recommended discussing the feasibility of dam disposition or modification options with the owner and Jordan River watershed stakeholders, but did not recommend stocking coolwater fish due to the potential negative effects on coldwater populations, and did not recommend stocking coldwater fish due to the potential negative genetic effects that hatchery fish may have on naturalized populations.

Current Status

The August 2009 survey of Deer Creek was the first survey since 1990. The survey included the 800-ft section upstream from Bergman Road, which is approximately half-way between Deer Lake and Patricia Lake. Sampling gear consisted of a two-probe, manually-propelled electrofishing boat, and a four-person crew. The survey followed standardized Status and Trends protocols established by the MDNRE Fisheries Division (Wills et al. 2008), and electrofishing efficiency was characterized as satisfactory. Riparian vegetation consisted mainly of tag alder, with various coniferous trees such as white cedar, tamarack, and black spruce. Aquatic vegetation consisted mainly of Valisneria and watercress. Water clarity was excellent throughout the station. There was a moderate amount of submerged woody debris, and there was some evidence of historic logging since a few large logs were embedded in the stream substrate. Undercut banks were scarce in the survey section. Average stream width was 29 feet, average depth was 1.5 feet, and discharge was 24 cubic feet per second. The bottom substrate was 90% sand and 10% silt. Although the survey section was characterized as run habitat, there were some pools present associated with woody debris. A temperature logger was placed in Deer Creek in 2005, which recorded hourly stream temperatures from May 17 to October 20 at Pearsall Road, which is approximately 3 miles downstream of Bergman Road. Average monthly water temperature varied from a low of 53.0°F in October to a high of 64.4°F in July (Table 1). Monthly maximum water temperature exceeded 70°F in June (73.2°F), July (72.4°F), and August (71.9°F), but it generally only exceeded 70°F for 6 to 7 hours during a few days of each month. The longest period during which water temperature exceeded 70°F was 8 hours on August 2, and the maximum daily temperature exceeded 70°F for only 21 of the 92 days from June through August. Raleigh (1982)

reported upper thermal limits for brook trout ranging from 68 to 75°F, and optimal temperatures ranging from 57 to 61°F. Although water temperature in Deer Creek occasionally exceeds the thermal optimum, it does so rarely and in short duration, making it quite suitable brook trout habitat.

The survey crew collected a total of 326 fish, which included 82 brook trout, 3 brown trout, and 7 other fish species (Table 2). Rusty crayfish were also present. The species composition present is typical of groundwater-fed streams in northern Michigan. Thirteen percent of the brook trout were of legal size (greater than 8 inches in length), and 33% (1 of 3) of the brown trout were of legal size (Table 3). Larger brook and brown trout were collected, with two 10-inch brook trout and one 15-inch brown trout. The age structure of brook trout (16 age-0, 27 age-1, 13 age-2, and 1 age-3) indicated relatively consistent recruitment. Although a significant catch curve regression could not be computed based on the age data, the annual mortality rate appears to be similar to other populations in northern Michigan streams. The mean growth index for brook trout was +0.3, indicating satisfactory growth that is slightly above the State average. In particular, mean lengths for age-0 and age-1 brook trout were higher than State average, mean length at age 2 was equal to State average, and mean length at age 3 was below State average. This decrease in length at age (relative to the State average) for larger trout may indicate low abundance of the larger prey items (fish) that larger trout consume; however, only one age-3 brook trout was collected. The low relative abundance of brown trout in Deer Creek suggests only low levels of natural reproduction. The presence of bluegill in the survey section is most likely a result of upstream migration from Patricia Lake, though fish could occasionally move downstream from Deer Lake as well. Since we only surveyed one small portion of Deer Creek, it should be noted that due to varying habitat, the surveyed section may not be representative of the species composition and size structure of the entire coldwater reach of Deer Creek.

Analysis and Discussion

Overall, the brook trout population in this reach of Deer Creek appears satisfactory. Natural recruitment is sustaining the population, which has not been stocked since 1965. Growth is satisfactory and angler harvest does not appear to be having any detrimental effect on the brook trout population. Hay and Meriwether (2004a) had suggested that "angling is reported to be good for brown trout with an occasional brook trout." The relatively low abundance of brown trout suggests that the community structure may have shifted towards brook trout, at least in the survey section. Angler harvest is unknown, though fishing line and terminal tackle were present in overhanging vegetation within the survey section. Anglers were also observed fishing at several of the other road crossings. The limited amount of public access restricts angling, though there is no doubt a modest amount of angler effort on the upper reaches of Deer Creek.

Information on Deer Creek below Patricia Lake is largely anecdotal, though it is known to hold steelhead in the spring as well as salmon in the fall. Additionally, in the spring of 1959 a congregation of walleyes was observed in Deer Creek (MDNRE files). Although a spawning migration of walleyes would not produce a fishery due to the closed season, it could offer a source of natural reproduction for the walleye population in Lake Charlevoix. It is unknown whether walleyes have migrated up Deer Creek in recent years. As mentioned by Hay and Meriwether (2004a), surveys are needed in Deer Creek below Patricia Lake to determine the extent of natural reproduction of steelhead, salmon, and walleyes. The impact of the Patricia Lake Dam on the temperature regime of Deer Creek is currently unknown.

Management Direction

Brook trout appear to be the dominant species in Deer Creek, at least in the upstream reaches above Patricia Lake. There appears to be a relatively smaller population of brown trout sustained by natural reproduction, though perhaps there are more brown trout in other sections. Currently, Deer Creek and its tributaries are managed with Type 1 trout regulations (minimum size limit = 8 inches, open/possession season from the last Saturday in April through September 30th, and no tackle restrictions), which are appropriate. These regulations will protect the brook and brown trout populations, while providing a modest fishery. Although angler access to the upper reaches could be improved by purchasing riparian land, the numerous road crossings on Deer Creek provide some access already.

The impact of the Patricia Lake Dam on the Deer Creek watershed should be further studied. This corresponds with Management Action 5 in Kalish (2007b). Study of the dam impacts should also include a fisheries survey of Deer Creek downstream of the dam, along with a temperature study of Deer Creek both upstream and downstream of Patricia Lake. While the removal of the Patricia Lake dam would no doubt increase the natural reproduction of desirable migratory fish species like steelhead and salmon, it could also result in an increase in the sea lamprey population. Some negative impact to the resident brook trout population could also be expected if the dam were removed and no barrier installed to control passage of Great Lakes fishes. Furthermore, as mentioned in Hay and Meriwether (2004a), the angler success in the localized fishery below the dam would likely be reduced. All of these factors should be considered, along with the dam owner's concerns, during any discussion regarding dam removal.

In 2001, the Charlevoix Conservation District, Conservation Resources Alliance, and Tip of the Mitt Watershed Council completed a road-stream crossing inventory of the Lake Charlevoix watershed (Anonymous 2001). In that document, twenty-two sites were inventoried in the Deer Creek watershed, with three sites ranking as severe, eighteen as moderate, and one as minor that required no action. In the entire Jordan River sub-watershed there were only five sites ranked as severe; thus, the three sites in the Deer Creek watershed represent a large proportion of those requiring action. Since the 2001 inventory, no sites have been repaired. There are several sites with extreme erosion that are in need of expensive treatments such as asphalt paving or bridge building, but the site probably in need of the most attention is the Fuller Road crossing. This site has extreme erosion, which adds considerable sediment to Deer Creek from the dirt road. As the inventory suggests, this sites should be repaired with a bridge and road paving.

In addition to rehabilitating degraded habitats in the Deer Creek watershed, it is paramount that the watershed is managed to prevent further degradation from practices such as excessive groundwater withdrawal and obtrusive development. Such protections correspond with Management Action 1 in from the Jordan River Management Plan (Kalish 2007b). Although the Jordan River is a State-designated Natural River, Deer Creek is not currently included in this designation. In order to provide the appropriate protection for the riparian zone of Deer Creek, the Jordan River Natural Rivers plan should be amended to include Deer Creek. This action also corresponds with Management Action 3 from the Jordan River Management Plan (Kalish 2007b).

References

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Table 1.–Summary of hourly water temperatures (Fahrenheit) of Deer Creek at Pearsall Road, from May 17 to October 20, 2005.

Month	Average	Range
May	55.1	47.8 – 63.6
June	63.8	53.8 – 73.2
July	64.4	54.6 – 72.4
August	62.9	55.3 – 71.9
September	58.3	50.3 – 67.5
October	53.0	44.3 – 65.7

Table 2.–Fish collected from Deer Creek at Bergman Road using electrofishing gear on August 11, 2009.

Species	Total catch	Percent by number	Length range (in)	Average length (in)
Blacknose dace	106	32.5	1-3	2.8
Brook trout	82	25.2	2-10	5.5
Slimy sculpin	67	20.6	1-4	2.4
Bluegill	22	6.7	2-4	3.2
Creek chub	19	5.8	2-5	4.1
White sucker	19	5.8	1-9	6.1
Longnose dace	5	1.5	2-4	3.9
Brown trout	3	0.9	3-15	8.5
Bluntnose minnow	1	0.3	2-2	2.5

Table 3.– Length-frequency of brook and brown trout collected from Deer Creek at Bergman Road using electrofishing gear on August 11, 2009.

Inch group	Brook trout	Brown trout
2	4	
3	26	1
4	3	
5	20	
6	11	1
7	7	
8	6	
9	3	
10	2	
11		
12		
13		
14		
15		1