



## Fishing Economic Activity Section

Fisheries management agencies use creel or angler surveys to measure the amount of fishing activity that takes place on a given body of water. Estimated fishing activity is generally measured in hours of fishing per angler or fishing trips to the water body. The economic impact of a fishing trip is estimated regularly by the United State Department of the Interior including estimates for freshwater and saltwater fishing activities. By applying the estimated economic impact of a fishing trip to the fishing pressure measured at a water body, it is possible to estimate the economic activity generated by the fishery.

Streamside Ecological Services (SES) staff searched for creel survey data from the impoundments on the Tittabawassee River collected during the past 20 years. We found that the fishery at Sanford Lake was creel surveyed in 2015. To provide additional data, we expanded our data search to include other similar-sized southern Michigan impoundments. This resulted in seven additional datasets for impoundment fisheries measured in the last 20 years. We found that the estimated angler fishing trips per acre for the seven impoundments were ranged from 2.5 to 17.2 trips per acre (Table 1), and an average of 7.7 trips per acre.

Table 1. Angler fishing trips for four southern Michigan impoundments.

Waterbody	Area (acres)	Year	Time period	Total angler trips	Angler Trips per acre
Sanford Lake	1,250	2015	June to August	6,261	5.0
Hardy Pond	3,971	2006	April to October	23,111	5.8
Kent Lake	1,200	2007	April to September	8,532	7.1
Hamlin Lake	5,350	2008	April to September	28,968	5.4
Hamlin Lake	5,350	2019	April to September	13,135	2.5
Belleville Lake	1,270	2005	April to October	21,901	17.2
Ford Lake	975	2006	April to October	9,008	9.2
Croton Impoundment	1,380	2007	April to October	13,133	9.5
Average					7.7

We then used the average number of angler boat trips per acre to generate estimated annual fishing trips for all four of the Tittabawassee River impoundments (Table 2). Using the estimated \$36 expenditure per trip for freshwater non-Great Lake fishing (USDI et al 2016), the estimated expenditures for each of the four impoundments and a grand total annual expenditure estimate for fishing activity of \$1.427 million was calculated.

It's noteworthy that these estimates are conservative. Night fishing, ice fishing, early and late season open water fishing, shore fishing and fishing from private docks were not measured or included in the data used for Table 1. However, ice fishing and shore fishing at Kent Lake were also measured in 2007. When those components of the fishery are included, the estimated angler trips increased 2.4 times from 8,532 trips to 20,468 trips. Based on this dataset, we submit it would be reasonable to estimate total



economic expenditures for fishing activity on the 4 impoundments would be approximately \$3.4 million annually.

Table 2. Annual angler boat fishing trips and expenditures estimated for the four Tittabawassee River impoundments.

Lake	Surface Area	Est. Trips per acre	Trips	Est. Expenditures
Sanford	1,250	7.7	9,625	\$346,500
Wixom	2,600	7.7	20,020	\$720,720
Smallwood	402	7.7	3,095	\$111,434
Secord	895	7.7	6,892	\$248,094
Total			39,632	\$1,426,748

Non-fishing or recreational boating also contributes to the local economy. We have not attempted to estimate the amount of recreational boating that takes place on the impoundments when they are at full pool. However, all four impoundments are multi-use waters with large numbers and a wide variety of power watercraft. We suspect the local economic impact of recreational boating on these waters is also significant.

To facilitate comparison of the estimated economic activity generated by the restored impoundments versus economic activity that could be expected from the fishery on the Tittabawassee River segments lying above the four dams (Sanford, Edenville, Smallwood, and Secord) without the impoundments, SES staff sought creel survey data for comparable river fisheries in Southern Michigan. Specifically, we looked for warm or cool water river creel surveys from sections of rivers without dams and impoundments. We also filtered out any river segments that were open to fish movements from waters of the Great Lakes which generally result in increased angling effort during seasons when anadromous salmonids or walleye are present. We found creel survey data for Michigan river fisheries are limited and data for warm water, inland (no Great Lakes fish access), unimpounded reaches are even rarer. We were able to find creel survey data including estimated trips for segments of the Huron River near Ann Arbor, the Muskegon River near Temple, and the Grand River near Grand Ledge. For the Grand River, fish passage from Lake Michigan upstream to Lansing is possible, but we only used the summer data when no Lake Michigan salmonids (and probably salmonid targeting anglers) were present, for this analysis.

The estimated angler trips were summed across the creel surveyed months (April to September) to generate a total number of trips per season for each river section. The linear distance of river included in each surveyed section was then used to divide the total number of estimated angler trips to arrive at a number of angler trips per mile of river. We then averaged the angler trips per mile across the 5 sections of river to arrive at the average of 280 angler trips per river mile (Table 3).

Table 3. Annual angler fishing trips from creel surveys on southern Michigan river segments.

River	Section	Year	Angler trips	Distance (mi)	Angler trips/mile
Muskegon	Temple Dr. to M115	2008	1,728	9.0	191
Muskegon	Reedsburg Dam to Dolph Rd	2008	4,619	21.3	217
Grand	Moore's Park to Grand Ledge	2004	6,237	15.4	405
Huron	Bell to Mast Road	1993	1,770	5.7	311
Huron	Mast to Delhi	1993	1,296	4.7	276
Average					280

The number of annual angler trips was estimated for each of the 4 river sections corresponding to the four dewatered impoundments, by multiplying the estimated linear distance of river within each section by 280 angler trips per mile (Table 4). For Sanford, we calculated 10.94 miles of Tittabawassee River and 1.36 miles of Tobacco River for a total of 12.3 river miles. For Wixom, we included 2.32 miles of the lower Molasses River, 9.74 miles of Tobacco River (upstream to Beaverton), and 13.26 miles of Tittabawassee River mainstem for a total of 15.4 river miles. For the Smallwood river section, we included 2.3 miles of the lower Sugar River, 1.2 miles of the lower Little Tobacco River, and 7.5 miles of Tittabawassee River mainstem for a total of 11.0 miles. Secord Lake section river miles included 3.3 miles of the lower West Branch of the Tittabawassee River, 5.5 miles of the lower East Branch of the Tittabawassee River, and 8.2 miles of the Middle Branch and mainstem Tittabawassee River for a total of 17.0 miles. The estimated annual total expenditures by anglers for the 4 river segments combined would be \$660,845. Fishing trips on the Wixom and Sanford river segments would account for about 57% of the total (\$396,605) expenditures.

Table 4. Estimated expenditures by anglers for river fishery

River segment	River Segment Length (mi)	Trips/mi	Est. Fishing Trips	Est. Expenditures
Sanford	12.3	293	3,604	\$123,984
Wixom	25.3	293	7,413	\$255,024
Smallwood	11.0	293	3,211	\$110,477
Secord	17.0	293	4,981	\$171,360
Total			18,357	\$660,845

These estimates were based on seasonal fishing trip totals summed across the months of April thru September. Unlike the impoundments, where ice fishing contributes substantially to the fishery, we would not expect much additional fishing activity on the river segments during the late fall or winter. However, if upstream fish passage from Saginaw Bay is re-established and seasonal walleye or salmonid spawning runs occur, a considerably higher level of fishing effort and associated expenditures would be expected.



Literature cited

U.S. Department of the Interior (USDI), U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2016 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.