

THE BIOTA OF A SECTION OF THE UPPER TIPPECANOE RIVER.

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The upper Tippecanoe River is the only stream in Indiana which remains approximately in a natural condition. By the upper Tippecanoe, is meant the Tippecanoe from its source to the point where it turns south near Ora, Indiana.

This part of the stream can be divided into sections of six or more types. For instance, just west of Warsaw it has a gravel bottom, has some trees along its banks, but is exposed to the sun for at least a part of the day. Much of this section produces a dense growth of eel grass (*Vallisneria*). Southwest of Atwood the river flows through a swamp. This is followed by a section of swampy woodland, where the river is shaded, contains few if any attached plants, and is obstructed at rather frequent intervals by logs and drifts.

It is planned to select a typical section in each of these divisions and make a quantitative estimate of the biota in order that some notion may be had of the stream's productivity.

During the summer of 1925 a beginning was made. This paper is a preliminary report of this study.

The section selected lies in Sec. 10, R.V.E., T. 32 N. about four miles west of Warsaw in Kosciusko County.

The physical facts are as follows:

Length of section=135 M.=440 ft.

Avg. Width=30 M.=97.5 ft.

Area=4050 sq. M.

Avg. depth on base line=.46 M.=1.54 ft.

Area of cross section on base line=13.94 sq. M.=150 sq. ft.

Avg. current rate=.0826 M.=.271 ft. per sec.

Rate of discharge=1.15 cu. M. per sec.=40.65 sec. ft.

This is 15 per cent of the minimum discharge at Springboro on the lower Tippecanoe a few miles above its mouth. The maximum temperature observed was 26° C.

About two-thirds of this section is covered with eel grass (*Vallisneria*). This grass has a very remarkable effect in the distortion of

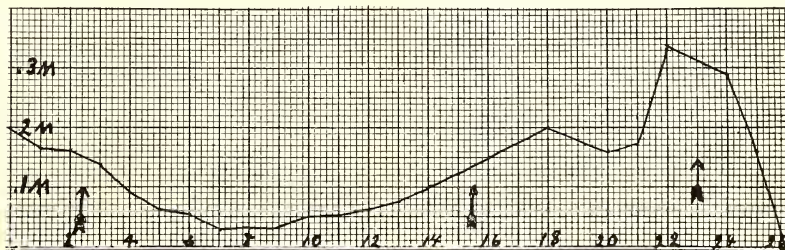


Fig. 1—Cross-section of stream showing current rate. See text for full explanation.

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the normal distribution of current rates. On a meander in an unobstructed stream the most rapid water is between mid-stream and the outer curvature. The sharper the curvature and the steeper the gradient, the nearer to the shore is the maximum current rate.

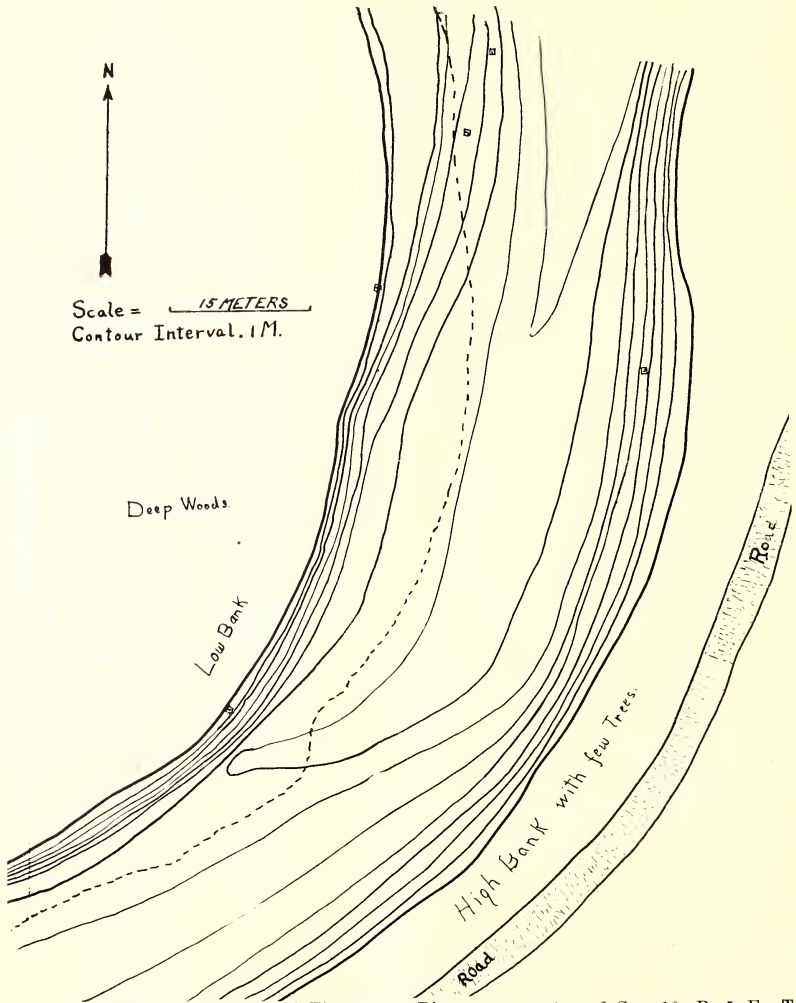


Fig. 2—Map of a section of Tippecanoe River near center of Sec. 10, R. 5 E., T. 32 N. Dotted line indicates west limit of dense eel grass.

The conditions in this section are shown in figure 1. The abscissa is the stream width and the ordinate is the current rate. The right side of the figure is the inside of the curve and the left the outside. The minimum is near mid-stream, slightly nearer the outer curve. The maximum is near the inner curvature with a second increase in rate near the outer curvature. See also figure 2.

Quadrats one meter square on different types of bottom in the section were selected. Cheese cloth was staked on the down-stream side of the quadrat and continued one-half meter up-stream on the laterals. All the microscopic organisms were removed, placed in tubs, sorted, counted and the more significant ones weighed. The more numerous organisms were eel grass, Sphaerium, snails and a tricopteron larva (Hydropsychidae).

The eel grass area amounted to two-thirds the total, or 2700 sq. M. Quadrat 7 contained the maximum amount, 3975 grams wet weight. Its dry weight was 350 grams.

The average amount for the area was 2400 grams per sq. M.

Total for the area; wet weight, 6480 kilos.=14,862 lbs.

Amount per mile of stream: wet weight, 180,480 lbs.; dry weight, 15,891 lbs.

Next to the eel grass the most conspicuous member of the biota was the bivalve Sphaerium, which reached a maximum of 272 per sq. M. with an average of 222 per lb.

The average weight per individual was .15 gram.

Number in area=880,000.

Weight per area=132 kilos.=202 lbs.

Weight per mile of stream=3345 lbs.

What seemed to be the most easily available fish food was a caddis fly larva (Hydropsychidae). Their average number per square meter was 110, the weight of which was 3 grams.

Weight for the area: wet=8711 grams=20+ lbs.; dry=2.38 lbs.

Weight per stream mile: wet=790 lbs; dry=94 lbs.

Goniobasis was the most numerous of the snails, although Physa, Pleuroceua, and Campeloma were present.

Near the shores the bottom became covered with organic detritus. Quadrats in this area yielded a different fauna from the typical mid-stream quadrats.

Quadrat 2 near the right shore contained 16 burrowing mayfly larvae (Hexagenia) and the following Odonata nymphs: Macromia, Dromogomphus 3, Hagenius 1. Seventy-four chironomus larvae were taken from this quadrat which was the maximum for the section.

Most of these observations were made late in July when the eel grass was approaching its maximum. Observations made earlier in the season indicate that the number of crayfish (Cambarus) taken in the quadrat collections is too low. It is difficult to capture them in the eel grass but collections early in June can be made to approximate quantitative results.

The entomostraca and copepoda were not estimated. They are found among the eel grass or near the bottom. Their habitat corresponds to the littoral in the lakes rather than the pelagic. They can be most accurately estimated by dipping a measured quantity of water and scouring it through a silk net.

It is a pleasure to acknowledge the assistance of my colleagues and students of the Biological Station. Especially should I note the work of Mr. F. F. Carpenter with the map and Mr. Herman P. Wright with the records.

