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INSTITUTE FOR FISHERIES RESEARCH
UNIVERSITY MUSEUMS
UNIVERSITY OF MICHIGAN
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Report 137

PLANS SUGGESTED FOR THE DEVELOPMENT AND MANAGEMENT OF THE
PIGEON RIVER AREA, FROM THE STANDPOINT OF FISH AND
FISHING

This Report is the contribution of the Institute for Fisheries Research toward the formulation of plans for the maximum development and public utilization of the Pigeon River area. It sketches the work already done by the Institute in the area, treats in outline the condition of the trout waters and embodies brief suggestions for future work. These suggestions are divided, as has been requested for all plans, into those proposed for (1) this year; (2) first five years, and (3) after first five years.

The great fishery asset of the area is trout. The stream conditions and suggestions for their improvement will therefore be given primary consideration in this Report. Other items will, however, be first mentioned.

1. STUDIES OF UNDERGROUND WATER, STREAM FLOW AND TEMPERATURE

These interrelated subjects are perhaps not of sufficient critical importance to warrant their extensive study from the fish aspect alone. We understand that attention will be given to these subjects on account of their importance to other Divisions. It is one of the five points of the whole scheme that work may be planned for that will be advantageous to more than one unit. We believe it important that a consideration of ground water, stream flow and stream temperature be undertaken by the Institute. The fact that such work has a bearing on fish problems is one reason why such investigations should be made.

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The Institute suggests:

(1) That, during the course of the study of ground waters, their temperatures be taken.

(2) That a stream-flow gaging station be maintained this year and for the first five years on the Pigeon River at Headquarters, and that readings be taken as often as the hydrologist thinks necessary to give a picture of seasonal and annual variations. We would suppose it desirable to have weekly maximum and minimum readings.

(3) That a maximum-minimum thermometer be maintained in the current at Headquarters, and that weekly readings be taken. The thermometer would need to be enclosed in a small metal cage. It could be hung from the bridge and hauled up for the readings on some definite day of each week. The sooner the temperature records could be started the better, and they should be continued for at least two years, preferably through the whole "first five years".

The data on stream flow and temperatures will be of importance in reference to:

(1) The possibilities of establishing a successful rearing station along the river.

(2) The problems connected with the abundance and condition of the trout in the stream.

(3) The study of the relation between rainfall, ground water, stream flow and stream temperatures.

(4) The possibilities of predicting ahead good and bad years for trout, especially brook trout. This is an important possibility, which may have importance to the fish management possibilities of the state as a whole.

2. LAKE SURVEYS AND DEVELOPMENT

The only surveys previously made on the lakes of the area are a few preliminary examinations by Metzelaar and Lenglois, and one Institute Survey of Lost Lake, made as an example of a good brook trout lake without inlet or outlet.

The lakes of the area although not thoroughly studied appear to be of subsidiary importance as contrasted with the trout water. They are rather few, mostly very small, little fished at present, and some are too boggy and shallow to warrant attempts at development. Considering the present status of conservation work in the state, it is suggested by the Institute that no work in the lakes be attempted for this year, except for following out planting recommendations already made. (No plantings in lakes of this area for the past four or five years are recorded by the Fish Division).

We recommend, however, that all lakes of the area be surveyed during the "first five years" to determine a planting program, and to determine whether improvements will be called for.

The small lakes should be included in the survey, especially because one of them (Lost Lake) has proved to be a very good brook trout lake. The detailed survey of this lake, already made, will serve as an index of the possibilities of other small lakes of the region from a trout standpoint.

3. STREAM SURVEYS AND DEVELOPMENT

A. Statement of work already done.

The streams of the Pigeon River Project area have of course been planted with trout for years. Following is a record of these plants for the last four or five years, as made out by the Fish Division on April 13:

Cheboygan County.

Big Pigeon River - Nunda Twp.

1931- 3,600 Brook trout 6 mo. old and 9, 125 Brook trout 8 mo. old.
1930- 6,000 Brook trout 6 mo. old.
1929- 9,000 Brook trout 7 mo. old and 300 Brook trout yearlings.
1928- 3,000 Brook trout 6 mo. old.
1927- 8,000 Brown trout 1 mo. old.

McMaster Creek - Nunda Twp.

1929- 3,000 Brook trout 5 mo. old.

Little McMaster Creek - Nunda Twp.

1929- 1,000 Brook trout 5 mo. old.

Otsego County

Big Pigeon River - Corwith Twp.

1928- 4,500 Brook trout 6 mo. old.

Pigeon River and tributaries. - Corwith Twp.

1931- 4,000 Brook trout 7 mo. old and 5,000 Brook trout 8 mo. old.

1929- 4,500 Brook trout 7 mo. old and 300 Brook trout yearlings.

A number of the streams of the area, and of the same water systems, have been examined by Department field parties. The cards for these are on file at Lansing and Ann Arbor.

The improvement of the Pigeon River as a trout fishing stream was begun in the summer of 1931. The Game Division allotted the sum of \$250,000 for improvement of pool and shelter conditions. (~~\$243.26~~ was expended, of which \$12.26 was cost of materials and \$231.00 was labor cost.) The Institute took charge of the planning and directing of the work and made a preliminary survey of trout stream conditions there. Findings are given in several reports (a list of these is appended) and details will not be given here, except as they affect tentative plans for further work.

The survey work of 1931 included cruising of the main stream of the Pigeon River from the Lansing Club dam to a point north of the south line of Cheboygan County. The stream was examined with the purpose of locating materials and places for the improvement work. Biological examinations were made at several points and records were made of the relative numbers and sizes of trout and other fish present at several points, parasite infestation in the trout, food and shelter conditions. Examinations were made at several points above and below the Pigeon Forest. Temperature readings on hot days were made at a number of points over a wide range of stream mileage.

The improvement work was undertaken primarily as a special project to test the effects of flooding (see Report No. 116). The work was so planned, however, as to help pool and shelter conditions on the main stream. Long areas of poor fishing water existed (and still do exist). The aim of the work was to change shallow, wide, and shelterless places

into habitats suitable for large trout. Deep pools were made and shelter was provided. At the same time, exposure to warming was decreased, wherever possible by restriction of the stream into a narrow, deep channel and deflection of the current toward available shade.

The cost, per pool-improvement device was \$3.29 and the cost of improving one mile of stream in poor original condition was approximately \$215.

A check of the result of several month's of exposure to forces of the stream was made during December and a notable increase of depth in the pools was found to have taken place from the effect of the stream current which had been accelerated by the deflecting devices. A further check of the effect and lasting qualities of the work was made during April. The work has, so far, resisted the forces of the stream in a very encouraging manner. Practically no damage to the work resulted from the experimental flooding of September 1931 or from subsequent stream action.

As a result of the 1931 brief studies, the following facts can be stated about the Pigeon River as a trout stream:

- (1) The stream is very cold at the headwaters and becomes progressively warmer toward the mouth, where it is not considered a trout stream.
- (2) Warming of the stream within the approximate limits of the Pigeon River Forest is quite considerable. Temperatures on a hot day, immediately below the Lansing Club dam were six degrees cooler than temperatures several miles below, at the Forest Headquarters.
- (3) There are many poor sections of stream, on the State Forest, which are without good pools and are badly exposed to warming by the sun. One of the poorest sections is that immediately below the Lansing Club dam. Others occur below, interspersed with comparatively good sections.
- (4) The major part of the stream which was examined was bordered by trees or brush but shade was considered poor over most of the area. Most parts of the stream are too wide to be adequately shaded by low brush.
- (5) Like most trout streams which are not very cold, the stream has a heavy

population of minnows, suckers and other stream fish. Although these fish serve as food for large trout they undoubtedly utilize much of the insect food that small trout feed upon.

(6) A rather large population of brook trout was found at several points on the State Forest. Brook trout outnumbered rainbows but the latter species averaged larger in size. Brook trout in the summer extend downstream to a point north of the south line of Cheboygan County. Rainbow trout extend farther downstream (one specimen taken at town of Afton) below the State Forest boundary.

(7) The brook trout are heavily parasitized by a black spot parasite (encysted trematode worm) but conditions indicate that the poor average growth of brook trout and light average weight of these fish is not due to this parasite, which does not ordinarily cause any notable effect on the health of the fish.

(8) The Pigeon River is fished rather heavily. It produced only fair catches last year as compared to catches which have been made in previous years (statement based upon opinions expressed by persons familiar with the stream over a period of some years).

(9) The season of 1931 and that of 1930 were unusually warm years. Temperatures of streams in the general region were unusually high and this is a probable reason why summer fishing on the Pigeon, Black and other was not up to the average of more normal years.

The Black River was studied in 1930 and 1931, particularly in connection with the improvement project carried on by the Black River Ranch. Temperature readings on a hot day were taken at several places representative of the greater part of the stream course. As a comparison with the Pigeon River, a number of statements are here given for the Black River:

(1) Extreme headwaters were not examined in these years. The stream becomes rather warm even as far upstream as the Ponemah Club (maximum reading of 73°), becomes a few degrees warmer below the Beaver Dam Club (reading of 75° on same date) and appears to hold at about the same temperature over many miles (same reading on Black River Ranch and below at the Clark bridge).

(2) Warming of the stream within the approximate limits of the Pigeon River Forest is apparently inconsiderable. The temperature appears to stay about the same for many miles (judging by the few readings taken).

(3) There are many poor sections on the Black River although none were noted which were as poor in trout pools and as dangerously exposed to warming as the poorest of the Pigeon River sections. However, improvements of parts of the Black would be desirable, both as a means of making better fishing pools and decreasing sun exposure.

(4) Parts of the Black River examined were mostly bordered by trees or brush; shade conditions were good in some places but poor at other places.

(5) Little seining has been done on the Black River. The seining done on the East Branch of the Black indicated a rather large population of minnows, suckers and other probable competitors of trout. A number of ling, a species large enough to feed upon trout, occur there (as also in the main stream).

(6) Brook trout are present in the Black and East Branch. Counts on the latter stream indicated that the abundance of trout was less than on the Pigeon. The average size was greater on the East Branch than on the Pigeon. No rainbow trout were found on the Black River or its tributary.

(7) The same black-spot parasite was found in trout from the Black and East Branch as that found in the Pigeon River trout. The percentage of infestation was much lower in the Black. The general condition of the Black River trout which were examined was better than that of the average Pigeon River trout. No thin trout were seen from the Black or East Branch (a large number of fish seen from the latter stream) and even individuals carrying a number of the black parasites were in good condition of body weight.

(8) The Black River is fished rather heavily, producing only moderate catches during the past season.

B. Plans for future work.

The plans submitted for future work on the trout streams of the Pigeon River

and Black River drainages as a part of the Pigeon River Project will be divided, as has been suggested for all plans, into (a) this year, (b) first five years, and (c) after first five years. Suggestions are divisible into (1) Survey work, such as can be done by a party of two men; (2) Stocking of streams, as a result of the Survey, and (3) Improvement work, which would necessitate a considerable item of labor.

(a) This year (1932).

(1) Surveys.--The most urgent need is for a more complete survey of the waters concerned. The entire stream should be looked over with the purpose of determining physiography, temperature conditions, food, shelter, and spawning ground conditions. Tributaries should be similarly studied. At least two weeks during hot weather should be allowed for a survey which will have as its purpose the development of plans. Detailed study of the trout population at several points should be made, and an additional two weeks, as a minimum, could profitably be spent in more extensive studies of numbers of trout and other fish present, parasites, predators etc. A special problem is the poor conditions, mentioned previously, of the Pigeon River brook trout.

The survey should include a follow-up study of the improvements that have been made. Permanence, effect in digging pools, and any changes in the work caused by the force of the water are being studied as a part of the improvement experiment (Mr. Tarzwell has made a check-up during December and another during April). During the summer, record of the effect of the improvement work on actual fishing conditions is greatly desired. The survey should also include a detailed listing of improvements needed, and of material available for their construction.

The forester and other local Department men can contribute to the project by keeping a supply of Creel census cards at hand, and making these out for every fisherman encountered on the stream. This could be the most important method of checking the success of the trout work in the area.

The survey should also yield, before fall, a definite planting budget for the entire project, and for the stream systems above the project area.

(2) Stocking.- It is recommended that this planting budget be followed out in the fall of 1929¹⁹³², insofar as fingerling or older fish may be specified.

(3) Improvement.- On the basis of last year's work, it is considered advisable to continue improvement of the main Pigeon River using methods similar to those used last year. Since the section of stream just below the Lansing Club dam is particularly poor in pools and is so exposed as to cause serious warming of the stream, it is suggested that plans for improvement of this section be developed first. If temperature can be held down in this section an improvement of the waters below will be brought about. Continuation of pool-improvement work, from the dam downstream, will make better fishing water in the very poor parts of the stream below the dam. Along with this improvement, narrowing of stream widths and deflection of the stream into shady places can be brought about. This will be the first step in improving temperature conditions the entire length of the Pigeon within the project area.

(b) First five years.

(1) Surveys.- A yearly check should be made of the summer temperature conditions, through the area, of catches of fish (by creek census cards and seining records) and changes in fish population (by means of seining). It is very desirable to locate what areas are used by the trout of these waters as spawning places. Some field work during the brook trout spawning season (October-December) would be valuable and a check-over of rainbow trout spawning places during April would also be desirable. Studies of the growth rate of the trout should be made so that information will be available to guide proper administration of the trout waters. Combined with trout counts, growth-rate studies should develop accurate information bearing on stocking recommendations. It is important to find out what number of trout per mile of stream will result in the best fishing. Studies of trout migration, to be carried on by means of tagging, should give important results particularly in respect to possible migration of brook trout into spawning places. Studies of the migration of rainbows are very important-how many rainbows stay in the stream until mature and how many descend into Mullet Lake are unknown points which should be ascertained. Studies of predators should have a place

in the program. Study of the black-spot parasite of brook trout, with special reference to possible control measures is important since the parasite makes the fish unpopular with many anglers.

The survey should include study of the permanence, effect, and best methods of stream improvement, of the sort which has been done or of other types which may be tried.

(2) Stocking.— It is recommended that the original planting budget be continued each year, except as modified by the accumulated experience.

(3) Improvement.—The main Pigeon River, and parts of the Black River, should be improved by a continuation of the present work, i.e., improving pool conditions and decreasing exposure to warming.

The exact mileage of stream which is in need of improvement has not been ascertained. It will be important to do this of course, in the near future. If we assume that ten miles of stream of the Pigeon River need this type of improvement the cost will run close to \$2000. If at least \$500 can be spent each season on this phase of the work this can be completed in four years. If a gang of men is to be hired for the special purpose of this work, as was done last year, it is economical (although not essential) to put at least that amount of money into the work at any one season to reduce loss of time in hiring and breaking in the men.

Desirable developments of stream management will involve the better utilization of existing shade (the weighting down of growing brush so as to force this to grow^{over} the water should be tried). In a few areas, experimental planting of shade should be profitably tried. Improvement of spawning grounds for brook trout in spring-water areas may possibly prove of benefit in the Black River or Pigeon River.

Accompanying the development of better fishing areas, it will be desirable to make some sections of the stream more accessible to fishermen than they now are.

The program might well include, besides an extensive improvement of the Pigeon River and parts of the Black River, plans for the intensive improvement of certain areas

as experimental and demonstrational areas. It will be of great value to determine just how much improvement is practical per mile of stream. The Pigeon would be a good stream on which to make this test.

Nothing has been done to improve tributary streams and these may be productive material with which to work. Plans for work on such streams, and a consideration of the desirability of closure of feeder streams is possibly desirable.

(c) After first five years.

(1) Surveys.-- Yearly records of conditions and catches would be desirable. After general surveys have been completed, special problems can receive a larger amount of attention. Studies of the efficiency of improvement methods would be important.

(2) Stocking.-- To be continued.

(3) Improvement.-- Following a five-year period, the improvement of the stream by the methods in use at present will probably have been completed, although further work may prove desirable as the result of the studies made. A small expenditure every few years will presumably be called for to replace such improvements as are destroyed by floods, etc. Effect of planting and other slower means of modifying conditions should be noted.

It will be possible, we hope to perfect the method for the management of the waters of the Project area so that the best fishing that the waters are capable of supplying can be enjoyed. Thus the recreational value of the area will be increased. Moreover, the records of a long-continued study of the methods, practicability, and effects of a project of this nature will be valuable as a sound basis for similar developments of other areas.

Information regarding the Pigeon River and Black River, in reference to trout stream matters, may be found in the following Institute reports:

No. 34. Report on Investigation of streams at Black River Ranch, Montmorency County.

No. 70. The black spots on brook trout at the Fontinalis Club, Vanderbilt, Michigan.

(The same infestation has been found in the Pigeon River.)

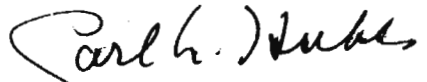
No. 87. Second report on investigations of trout streams, Black River Ranch, Montmorency County (June, July 1931). (This report should supplement No. 34 in respect to temperature inclusions).

No. 107. Temperature conditions on the Pigeon and Black Rivers (Cheboygan, Otsego, and Montmorency Counties).

No. 116. Experimental trout-stream improvement work on the Pigeon River in 1931.

This report was prepared by John R. Greeley and Carl L. Hubbs.

INSTITUTE FOR FISHERIES RESEARCH



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FISH DIVISION

April 23, 1932

SUPPLEMENT TO REPORT NUMBER 137

PLANS SUGGESTED FOR THE DEVELOPMENT AND MANAGEMENT OF THE
PIGEON RIVER AREA, FROM THE STANDPOINT OF FISH AND
FISHING

On April 19, 1932, the following suggestion regarding the Pigeon River Project was received from Mr. Fred A. Westerman, Department of Conservation, Lansing, Michigan:

"Since our conference at your office last week regarding the Pigeon River project, I have been thinking about ways and means of securing information regarding the productivity of the stream.

"We seem to be in agreement that accurate and definite information is needed and I take it from our discussion that Dr. Greeley and you think that opportunities are presented here for stream improvement. What we are most interested in is what kind of management will yield the largest number of fish in the sportsman's creel. We all realize the difficulty of securing an accurate census of the fish population in any stream, particularly where conditions are best suited for trout.

"It occurs to me that a plan might be worked out whereby we would hope to secure the united cooperation of the sportsman who use this stream. What I have in mind is the possibility of setting up arbitrary sections of the stream and undertake to secure complete reports of the number of fish taken throughout the season in the respective sections, and such other information as is asked for on the creel census card. This would be continued over a period of years with the expectation that stream improvements would be carried on in one or more of these sections, while some others would be left in their present condition. Planting could of course be done as conditions would seem to demand or as your investigations would reveal as desirable, or necessary.

"Receptacles for depositing creel census cards could be provided at several places along the stream with provision for supplying cards in the same manner. It would, of course mean some local advertising and the cooperation of the caretaker. The success of the plan would depend much on the degree of complete cooperation that we might secure.

"I believe that this might be initiated with comparatively little expense and should be started soon in order to get returns for the current season. I welcome your criticisms and suggestions - also your ideas as to the sections where such patrols might be established.

"It would occur to me that the portion of the stream in Otsego County below the north line of Section 20 in Township 32 N., R. 1 W., could be split up into two or three such zones with possibly the addition of another zone down-stream - or that might be added later after the success of the plan was definitely determined. The

reason for suggesting the portion of the stream in Otsego County is that the headquarters are established in this area and it would seem to hold the best possibilities for trout fishing."

We quite agree with these statements and suggestions regarding the advisability of obtaining actual catch records of trout from the Pigeon River project area. In our Report we only went to far as to suggest that the forest and other state officials of the area do everything possible to build up a large return of creel census cards from the area. We did not go to logical limit you suggest merely because we saw no means which appeared practical to obtain reasonably complete returns.

It is of course possible that following stream improvement the catch per hour might go up a good deal faster in proportion than the increase in fish population. This would follow from the increased ease of catching the fish congregated about the more desirable habitats created in the stream.

It would certainly be desirable to start records of catch at the beginning of the present season, in areas to be improved later as well as in control areas to be left unimproved. The division of the stream into numbered sections would be very desirable. This should be done in reference to recognizable landmarks and in reference to future plans for improvement. Probably signs of good readable size would be in order, reading on one side, say:

YOU ARE NOW ENTERING STREAM SECTION 3 AND LEAVING SECTION 4		
EXPERIMENTAL IMPROVEMENT PIGEON RIVER		
Make out separate creel census card for each section fished.		
Supply blank cards in this box <input type="checkbox"/>	<input type="checkbox"/> [Notice regarding work and map to go here]	Put filled out cards in this box <input type="checkbox"/>
DEPARTMENT OF CONSERVATION		

The notice below might read somewhat as follows, in bold letters:

ATTENTION ANGLERS: The Department of Conservation is undertaking to improve fishing in this river by stocking and by stream improvement. The experience learned here will be valuable in building up the fish supply

everywhere. A complete record of fish caught in this stream is needed to check results. Your cooperation is requested.

PLEASE FILL OUT A SEPARATE CREEL CENSUS CARD FOR EVERY STREAM SECTION FISHED.

Indicate section fished on upper right corner of card. Fill out card whether any fish are caught or not. Thank you.

DEPARTMENT OF CONSERVATION.

SEE MAP ON OPPOSITE SIDE OF SIGN

On the reverse side, the sign might read:

You are now entering
STREAM SECTION 4
and leaving SECTION 3
READ OTHER SIDE

On this side the project area map could be placed (^{consult Webb on method} ~~under glass~~), with all stream sections marked clearly in colored pencil and with a conspicuous statement and ^{an} arrow pointing out: **YOU ARE NOW HERE.**

Small metal mail boxes as used on residences would provide suitable containers for blank cards and for those filled out.

Since the Fish Division seems to think the idea practical, we join in suggesting it be carried out, or at least given a good trial. Full publicity ~~through~~ the whole state press, and through the local press would be desirable, plus instructions to all state employees to keep the public informed and to fill out cards whenever they meet someone who has not done so already. Dividing the sections at bridges or other points of easy access to the stream would insure that most anglers would be acquainted with the request from the start of their fishing—also that they would have a place to deposit their census cards on leaving the stream.

In order to determine what proportion of returns are made we would suggest that on several test days through the year a complete check be made on the days fishing

of all persons leaving or camped in the area.

Suggested sections for creel census returns Pigeon River.

1. Part of stream from Lansing Club dam to first road bridge below (in sec. 20 of T 32 N R 1 W).
2. From bridge to first one of the improvement devices (in sec. 17, same township).
3. From first of improvements to last one of improvement devices (above the ford).
4. From last of improvements in this region to the ford.
5. From the ford to the bridge at headquarters.
6. From this bridge to first one of improvement devices in the sandy section of the river in sec. 9 (same township).
7. From first of improvements to last of improvements in this part of the river.
8. From last of improvements in this strip to first of improvements of the third improved region (near county line).
9. From first of these improvement devices to last of them.
10. From last of these to the road in sec. 28 of T 33 N R 1 W.
11. From this road to the road in sec. 17 of same township.
12. From this road to the road north line of sec. 8 (same township.)
13. From this road to the next road, on north line of sec. 5 (same township.)
14. From this road to northwest boundary of Pigeon Forest, in sec. 30 of T 34 N R 1 W.

This listing has been made from the map of the Pigeon River project. Several parts of the river which have not been surveyed by the Institute party are unfamiliar to us and we are not sure that all points are easily accessible by the road shown on the map. There would be no objection to changing certain of the designated sections in order to make them limited by points of greater accessibility.

However, it is important to keep each of the three improved parts of the river (designated as sections 2, 6 and 8) as a numbered area. It is also important to have

the unimproved areas numbered, but the exact limits of each of these do not need to be made exactly as designated in the listing. However, it is important to divide the river, in the project area, into a number of short sections. The limits of these, as far as possible, should be easily accessible points, by which fishermen enter and leave the stream.

In the event that it may not be possible to set up all of the necessary stations for census cards in time for this year's fishing season it will be most important to concentrate on those in the three improved areas, together with several check areas of unimproved parts of the river near the Forest Headquarters. The lower part of the stream (sections ¹⁰9 to ¹⁴13 of the list) is of less immediate concern.

This supplement prepared by John R. Greeley and Carl L. Hubbs.

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