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PROPOSED PROGRAM OF EXPERIMENTAL PROJECTS TO BE UNDERTAKEN IN THE SCREENED STREAM SECTIONS AT THE HUNT CREEK EXPERIMENT STATION

by

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The screened stream sections now nearing completion at the Hunt Creek Fisheries Experiment Station are ideally constituted for attacking a multitude of practical fisheries problems. In consequence, it has proved difficult to assign priority to various desirable experiments, many of which seem equally important. The writer has prepared the following outline of proposed projects with priority designations, the whole embodying the results of conferences with interested staff members.

There is appended to this report a sketch map of the new and old channels, showing their relation to each other, the location of screen-holding bulkheads, and the rim of the valley through which Hunt Creek flows. The map of the original channel was reduced, as accurately as possible with the means available, from the sheets of the plane-table survey of 1939, and the new channels drawn in free-hand.

Sections III-A and II-A flow quite close to a high, abrupt bank, as does most of II-B. Section III-B was excavated through a deep sand-and-gravel flat which was probably deposited in the basin of a dam in the

lumbering days, and which supports but little vegetation. This section, the first excavated, is at present quite straight and with considerable drop. It is planned to install small-scale barriers in this section to break the flow, create a few pools, and generally impart to it a more natural appearance.

Section II-B probably follows what was once the original stream channel. This conclusion is based upon the discovery of several branded saw logs at depths of two to four feet when excavating here, as well as upon the appearance of the gravel uncovered, and the configuration of the high bank under which the new channel passes. It receives an abundance of shade from the high bank itself and from the rather heavy stand of cedar, aspen, Balm-of-Gilead, tamarack and birch growing there.

Section I-B was excavated through a natural seepage area which, like II-B, probably was the site of the original channel, the change having been brought about by a second, lower dam whose ruins lie just above the head end of I-A and I-B. Both of these sections receive but little shade except in early morning and late afternoon.

Very desirable bottom material was uncovered in all three of the newly-excavated sections, and there is every reason to suppose that near-maximum food production may be secured after the passage of sufficient time.

It will be necessary to throw up dikes in a few places, as indicated on the map. It is hoped that a CCC Project now on file may be approved in time for some of this work to be done during the present season. In addition to the diking, it will be necessary to plane back the sand banks of section III-B, and to level off some of the dirt removed during excavation. It is hoped that some sodding may also be done as soon as the weather permits, both along the stream and on one of the hillsides

where existing sod was damaged by trucks during construction of the bulkheads.

A certain amount of damage to the stream bottom fauna was an unavoidable concomitant of the bulkhead construction. We have not yet been able to determine with certainty the extent of this damage, and the plan of operations as proposed here may be altered in some particulars, out of necessity. At present it appears that there was a heavy loss, through desiccation, of sessile forms such as caddisfly pupae and some larvae, and an indeterminate number of free-swimming mayfly nymphs which were left stranded in shallow depressions when the water receded after being blocked off to permit installation of concrete work.

It is reasonably certain that only small numbers of fish can be held in the new channels between now and next fall, as at least that much time must elapse before food organisms will occupy the new habitat in numbers comparable to those originally existing in the old channels. The new channels were created after a majority of the aquatic insect adults had completed their breeding. However, immature bottom forms are gradually appearing in the new sections by simple spreading or dislodgement from adjoining unmolested stream areas. A square-foot bottom sample taken on December 20 near the middle of Section I-B contained a total volume of 0.2 cc. of organisms, as compared with an average production of 1.4 cc. per square foot for ecologically similar areas of undisturbed bottom. Most of the invading forms were species known to be directly utilized by trout--midge and black-fly larvae, and a few mayfly nymphs. A continuous check will be maintained to determine the rapidity and the order with which bottom-inhabiting fish food organisms establish themselves in the new channels.

Despite the paucity of food organisms present, it has been decided to commence the experiments listed below as soon as screens are available, which is expected to be about January 15, 1941. The winter season is to our advantage, as it is known that in natural waters trout food requirements are low during very cold weather. Also, invasion of the new or distrubed areas by food organisms from adjoining stream sections may be more extensive than we have anticipated.

There follows a list of proposed projects. The section designations are those employed on the appended sketch map.

1. In view of the initial success achieved in making population counts within screened sections at Hunt Creek (as mentioned in activities reports of the writer and D. S. Shetter, and now being formally reported upon by the latter), it is suggested that Section I-A be left open for an indefinite period to serve as a station for repeated population counts. The system of population counting whereby a natural section of stream is suddenly closed off by screens and allowed to drain itself out appears to be the most accurate yet devised. Information from such activities should be of much practical value when correlated with results obtained from the periodic seining program and with (5) below.

2. The desirability of devising and testing additional methods for marking fish is apparent. Since preliminary work at Hunt Creek during the fall of 1940 suggested that a method involving hypodermic and intramuscular injections of colloidal mercury sulfide (HgS) shows promise, especially as it avoids mutilation and is applicable to small specimens, it would seem logical to set aside one section to be stocked with trout of various sizes, ranging from 25 or 30 millimeters through legal length,

marked in this way, together with a like number of unmarked trout to serve as a control on mortality and rate of growth. It is also desired to test out a new tagging method whereby celluloid disk tags are affixed to the fish through the back just anterior to the dorsal fin. This method, if found feasible, would allow ready following of the movements of individual fish, as colored disks might be used which would be visible to an observer concealed on the bank. Such an experiment, which might be carried out in Section I-B, should last from six months to a year, to supply adequate information on the likelihood of fading of the black injection mass or sloughing off of the injected tissue, and on the permance of the new type of tag.

Before starting this experiment in I-B, however, it is planned to spend about a week's time in giving a further trial to the electric fish screen supplied for testing purposes by the manufacturer. It is planned to screen the section, remove all fish, install the electric screen across the channel near the center of the section, place some marked trout in each end, and determine whether they are able to cross the electrified field.

3. Operating on the assumption that natural food supplies may be one of the most important factors determining carrying capacities of trout streams, it would appear desirable to maintain one section wholly free from fish to serve as a control, through the medium of bottom sampling and adult collections, of the extent of feeding pressure in other sections and in the remainder of the stream system. It is proposed to set aside Section II-A for this purpose.

4. In accordance with calculated carrying capacities, one section should be stocked with equal numbers of hatchery and wild trout fingerlings, as soon as possible. Overwinter observations on relative mortality and growth rates should be most valuable. If, by the time warm weather arrives, the food supply is found to be inadequate, the experiment should be discontinued, and resumed at the time of the regular fall trout-planting season in 1941. Section II-B has been designated for this project.

5. It is obvious that very worthwhile information could be obtained by stocking the upper original stream section (III-A) with a number of trout and muddlers similar to that encountered when it was first drained down and, preserving the size ratios found at that time, keeping accurate records of the effects of different population levels on total poundage produced and on the rate of growth and the bottom food supply. At first, this experiment would have to be confined to a single section; but as a test of this sort should yield a great deal of practical information, it might well be continued, in one form or another, over a period of several years, and extended to other sections whenever possible.

6. One section, III-B, should be stocked with equal numbers of wild and hatchery fingerlings, marked for recognition, to be sampled frequently to throw light on feeding habits. This experiment would be undertaken in the hope of providing definite data on the questions of how soon after planting hatchery fish start taking natural foods, how successful they are in securing the same variety of organisms taken by wild fish, and how efficient they are in utilizing this fare. Probably a month or six weeks would be adequate time to allow for this project.

To the end that interested parties may be kept abreast of the progress of experiments in the screened sections, and recognizing the fact that circumstances may sometimes force an alteration of the plans listed here, it is proposed that any significant change in the present outline be recorded in the form of an appendix to this report.

INSTITUTE FOR FISHERIES RESEARCH

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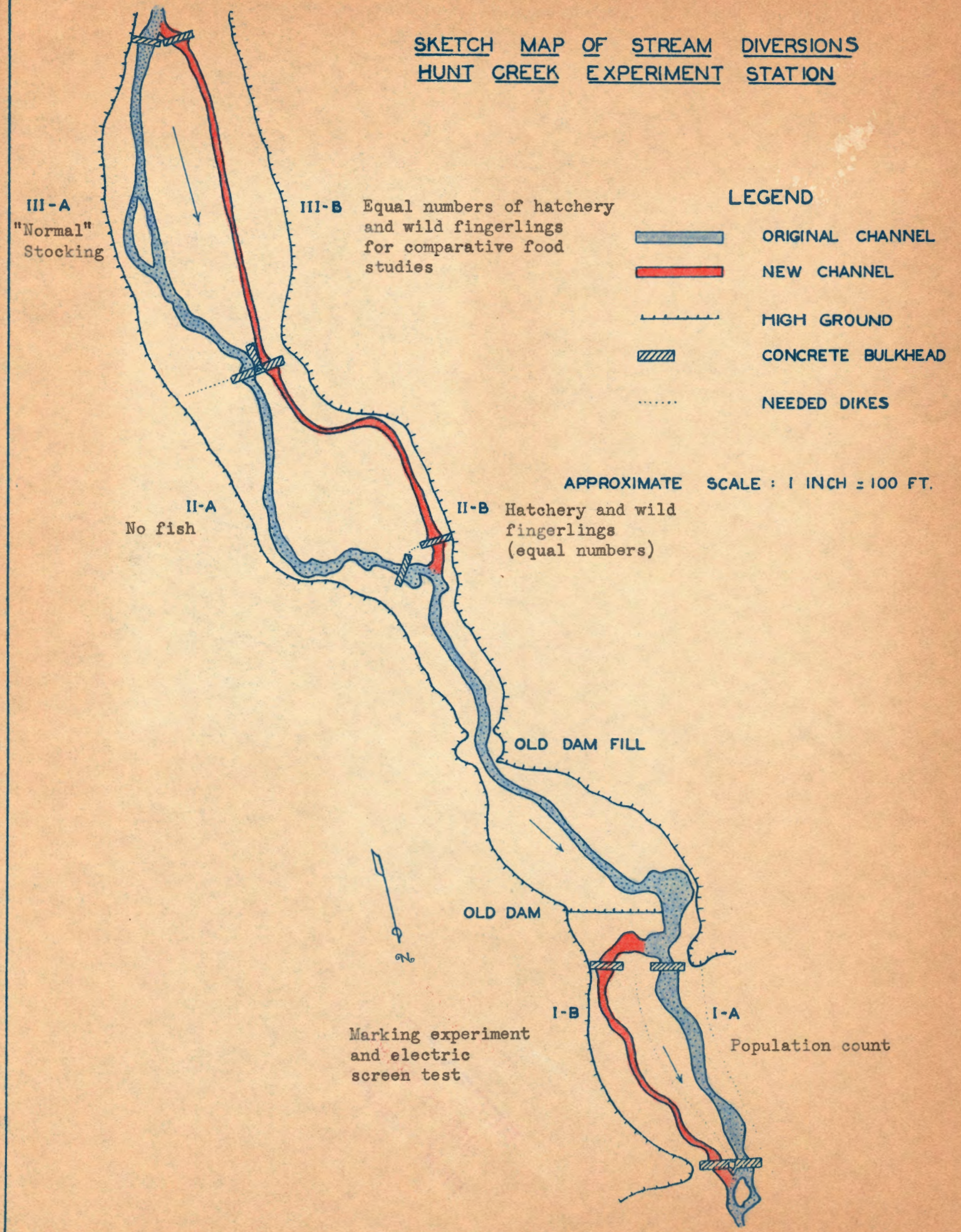
SKETCH MAP OF STREAM DIVERSIONS
HUNT CREEK EXPERIMENT STATION



J. W. LEONARD 12-31-40