

April 26, 1932.

INSTITUTE FOR FISHERIES RESEARCH
University of Michigan

REPORT NO. 93 (Second Installment)

Second Installment: Suggestions for surveys and for fish management for the year 1932.

This second installment of the Report on the survey and development of Iowa's sport fisheries is prepared in Des Moines as the result of conferences with certain members of the Iowa Board of Conservation, the Iowa Fish & Game Department, the Iowa Fish & Game Commission, the Iowa Board of Health, and the Iowa Conservation Plan organization. These conferences were held on April 25 and 26, 1932, following a study of reports covering the investigations, surveys and recommendations of Harry E. Hart, State Fish Pathologist, Dr. G. W. Prescott, and others.

The first installment of this report was a very general and brief set of suggestions, made prior to the obtaining of any specific acquaintance with the fish conservation problems which are peculiarly Iowa's. The present installment embodies our ideas of the survey and management work which could under existing conditions be effectively undertaken in 1932. Except insofar as precedents may be established by following through the suggestions here made, it involves no definite statement of policies. Neither does it cover any suggestions concerning the organization of the state fish work, or concerning surveying or managing for future years. Further suggestions may later be offered regarding these points.

It strikes us as being vital to the effective development of Iowa's fish supply that a well trained technical man be engaged on a full time basis. The problems facing Iowa are so difficult, and are increasing so alarmingly in their seriousness, that technical help will continue to be needed, and will be of increasing importance; more than that,

of necessity. We refer to the problems of silting, of pollution, of algae nuisance and control, of diseases in nature and hatcheries and of overfishing.

We therefore suggest that a technically trained man be employed at the Commission's earliest convenience. This man:

1. should know the fish problems of the prairie region from long experience;
2. should ^{know} fish thoroughly both as an angler and as a scientist;
3. should have primary interest in the conservation and upbuilding of the fish supply rather in purely scientific work; yet
4. should be capable of applying most approved and modern scientific methods in the solution of the problems confronting the state, and
5. capable of cooperating with other investigators at the State College, State University, and other institutions, and of coordinating their work with his own and of applying these combined results in practice; and
6. should be mature enough and of proper character to succeed in public relations.

If the same man can serve in a similar capacity on the technical side of game research and game management, so much the better. If fitted for educational work as well, both among children and adults, he would be an ideal person for the position. It is quite possible that a man of these many qualifications could be secured.

For the purposes of this report and probably of others to follow the state is divided into four quite natural though overlapping fishing areas, as follows:

1. The Commercial Fishing Area:
This area involves the Mississippi and Missouri river bottoms forming the east and west borders of the state, and such other waters as are utilized chiefly for commercial fishing or clamming. Except insofar as this area is used in the rescue operations for the development of interior -water

game fish development, the problems of this area are not specifically touched upon. As these problems are essentially inter-state in their nature, and as the Bureau of Fisheries has developed this aspect extensively it is more in order that that government bureau should offer suggestions and plans covering the state's commercial fisheries.

2. The Southwestern Fishing Area:

This area covers that portion of the state lying southwest of the ~~area~~ glaciated portion of the state, and to some extent areas of a similar physical character and fish population elsewhere. It has been mapped as the "Catfish Area". In this area catfish and bullheads are probably the dominant fish caught. It is, through the warmth and variable flow of its ditched waters, and through the overshadowing problems of stream silting due to soil erosion, a difficult region to develop from a fish standpoint.

3. The North-central Fishing Area:

This region roughly coincides with that portion of the state covered by the last or Wisconsin ice-sheet. It is consequently marked by the development of a considerable number of glacial lakes, which are among the most valuable resources of the state. This area has been charted as the "Pike Area". The dominating conservation problem of this area is pollution of the included lakes and streams by sanitary sewage and industrial wastes, and also by organic leechings of an agricultural and soil origin.

4. The Northeastern Fishing Area:

This rough and relatively wild portion includes the only trout streams of the state. The developed and potential value of the trout fishing may well rank, along with the very wildness of the area, as one of its outstanding economic assets.

I. SUGGESTION REGARDING ALL FISHING AREAS.

1. Inventory of Fish Yield:

Of fundamental importance in the understanding and management of the fisheries of any state is the keeping of an inventory of the fish yield. This we take to be too self-evident to require argument.

An inventory is of importance for both the commercial and the sport catch. A method of statistics that will yield a really accurate estimate of (1) the catch per unit of gear, and of (2) the total fishing yield, and both (1) and (2) for each section of the great marginal rivers of the state, should be assured. The importance and urgency of this need calls for the improvement of the methods of gathering the statistics, and for the application of the improved methods at once. This of course is a problem to be worked out in conjunction with the Bureau of Fisheries, as already indicated.

2. The Creel Census.

7 For the sport fishery, however desirable this might be, it is obviously impracticable, except perhaps for certain lakes, to obtain any definite figures on the actual total yield of the fishing. It is possible, however, with the active cooperation of all conservation offices in the state, and of others if this be thought expedient, to obtain records which will indicate the yield of the fishing, in terms of number of fish caught per hour of fishing. This can be accomplished by ~~the extensive~~ ^{a continuation of the} and proper use of the so-called creel census system, ~~which we understand has~~ recently been adopted by Iowa through our suggestions.

With proper explanations, gathering this data will allow officers to inspect catches without engendering ill will, and will even serve to bolster up the good will of the public toward the Fish & Game Department.

In applying this system, it is of importance that each officer, or other person trusted with the responsibility of properly gathering the data, interview as many anglers as possible, inspect their catch and make out the creel census card completely. The instructions should always emphasize, that a card must be made out, whether or not any fish has been caught, even when the angler has only been fishing a short time. The purpose is to get at the real facts.

The primary value of the creel census to Iowa will be to determine (1) for each fishing area of the state, (2) for each county, and (3) for each lake and stream,

- (a) The kinds of fish caught, with proportions of each, and with an estimate of number of small (illegal) fish caught and returned.
- (b) The success or failure of fish plantings.
- (c) The rise or fall of the fish supply.

3. Soil Erosion Control.

Although this is not primarily a fish or fishery problem, it is absolutely fundamental to any conservation or development of the fish supply of Iowa, either of the commercial or the sport categories. This point should never be lost sight of viewing the fishery problems of the state. Every successful move toward soil erosion control means more and better fishing for the state, as it means also the saving of its other natural resources.

Any erosion of sand or mud into trout waters reduces the food for the trout, tends to fill up the trout hides and otherwise holds down the trout population. It is therefore important, in connection with any development which may be undertaken in the Northeastern Fishing Area, that some

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consideration be given to prevention of soil erosion here, even if only of small amount. A start there might well be made in 1932.

In the North-central Fishing Area erosion is also very important to the fish supply. This is true not only of gully heads, which should be blocked, but also of the streams, and of the lakes. Especially at Storm Lake prevention of bank erosion will be a factor in rehabilitating the waters. Here willow planting, presumably by trenching in logs at the base of the cliffs, could to good advantage be made a 1932 project.

In the Southwestern Fishing Area, soil erosion and the resulting silting is even more the dominating problem of fish conservation. Any progress that can be made in this section in farmland erosion control in 1932 would be abundantly worthwhile from the fish standpoint. In this area the greatest chance to increase the fish supply will be the extensive construction of ponds and artificial lakes on the streams -- which development will also contribute vitally to the solution of the erosion and stream silting problems. These artificial lakes are referred to again below.

4. Hatchery Inspection.

As a part of the general survey of Iowa's fish resources, and of recommendations for the 25 year plan, inspections of the existing hatcheries have been generally proposed, and seem important to us. For 1932 we would suggest that a party of fish culturists and fishery investigators be asked:

- (1) to make a tour of the existing hatcheries,
- (2) to consider the fish cultural problems of the state, and
- (3) to draw up a report embodying suggestions, if and when needed,
 - (a) on the present hatcheries and their operation,
 - (b) on the need for additional hatcheries for different species of fish and for,
 - (c) cooperation between the federal and state hatchery services, and
 - (d) on general fish cultural problems and policies for Iowa.

We suggest that the party be selected to represent:

- (1) The Iowa Department of Fish & Game;

- (2) the Division of Fish Culture, U. S. Bureau of Fisheries;
- (3) the Division of Scientific Inquiry, U. S. Bureau of Fisheries;
- (4) the Division of Fish Culture, Ohio Division of Fish & Game; and
- (5) the Institute of Fisheries Research, University of Michigan.

Some time in July or August would perhaps be best suited to this inspection.

5. Reconnaissance Survey of Iowa's Lakes and Streams.

On account of financial conditions it is not proposed that a lake and stream survey of the state be undertaken in 1932 on anything approaching the scale which is really required to serve as sound basis for a 25 year program. This program should involve in itself provision for an intensive survey leading to definite fish management recommendations. This of course should be one of the main functions of the technical man proposed above for the Department.

As to whether any lake and stream survey should be carried out in the summer of 1932 may depend on whether a technical man is on the staff of the Fish & Game Department, and on funds available. It would be extremely desirable to have more detailed information on the character of the waters of the state, before the outline for the 25 year program is prepared.

It is probable that the Michigan lake survey party of 5 could be allotted to a survey of certain Iowa lakes, say those of the Okoboji chain, for about two weeks. The expense involved would be \$5.00 per day per man, plus expenses; or \$350.00 for the party for the two weeks. This party would obtain the data for and prepare colored maps and reports showing:

- (1) outline of lakes and surrounding land features;
- (2) bottom of lakes, in color;
- (3) depths of lakes, in figures and contours;
- (4) weed beds, by symbols showing kind and abundance of weeds;
- (5) the food organisms (rough work);
- (6) the forage fishes, coarse fishes, predacious fishes and game fishes; species, number; and past and present abundance.
- (7) the fishing and recreational conditions, all leading to --
- (8) a planting budget for each lake, and
- (9) recommendation for fish refuges if needed, and

- (10) a lake improvement program, covering increase in spawning facilities, shelter, food production, etc.

A stream survey is probably even more urgently needed. A slight amount of survey work in the Northeastern Fishing Area may be made in connection with the trout stream improvement there. Dr. M. M. Ellis may be able to contribute some information on the fish life conditions of the streams, made in connection with the mussel studies proposed to be carried on by the Bureau of Fisheries under his direction.

In our organization it would be desirable to send a party of at least 3 for at least 4 weeks through parts of the state, to determine:

- (1) the character of the water (physical and chemical);
- (2) the nature of the stream bottom;
- (3) the degree of pollution and silting;
- (4) the natural fish food (kinds and abundance);
- (5) the forage fish present (to be collected and sent to Dr. Hubbs for identification);
- (6) the game fish present (and their abundance);
- (7) the history of fishing, and of stream changes;
- (8) a stocking policy;
- (9) stream improvement possibilities.

In connection with the survey, locations of new sites for hatcheries, rearing stations and rescue stations might well be examined.

It would be very desirable to have a representative of the State Board of Health with the party, to make the chemical determinations.

II. SUGGESTIONS REGARDING THE COMMERCIAL FISHING AREAS.

In this report we make a few suggestions bearing on this fishing area. The hatchery inspection just proposed should deal with the problems of fish rescue work and of possible fish propagation along the Mississippi, and perhaps along the Missouri too. The gizzard shad for the experimental planting for algal control would be obtained in this rescue work. Any soil erosion activity would benefit the great rivers to some degree. We have stressed above the need for obtaining very accurate statistics of the commercial fish catches.

The great problems of the great rivers, being interstate and having already been very extensively studied by the Bureau of Fisheries, should be reported upon by that agency. The problems are many and include:

- (1) the relation of silting to fish and mollusc life;
- (2) the relation of navigation improvement to the fisheries;
- (3) the relation of pollution to the fisheries;

- (4) the possible alleviation of these nuisances;
- (5) the recognition of depletion in the fish and clam stock;
- (6) the proposal of regulations designed to maintain the supply;
- (7) fish and mussel culture, and
- (8) the practical application of these fish cultural studies.

III. PROJECT FOR THE NORTHEASTERN FISHING AREA (trout stream improvement).

We recommend that progress be made toward improving the trout conditions in the relatively few trout streams of the state. Such work should involve temperature control by increased shading, increased cover, and by diverting the current against banks already shady. Holding down the temperature increase will lengthen the ~~length~~ ^{period} of the streams available to trout, and thus increase the trout production. The numbers of trout can also be increased by increase in cover and by deepening holes in the stream, and by making fish retreats with limestone slabs.

For 1932 we recommend that one trout stream, or two, representing the various conditions found in Iowa trout waters, be improved as a demonstration project. We offer to send over Mr. Clarence Tarzwell, our expert in charge of trout stream improvement, for two weeks, at \$5.00 per day and all expenses, to work with 2 to 4 men supplied by the Fish & Game Department. This party would be able to work out the technique of trout stream improvement in this state and could put in a demonstration area from examining which others could continue the work in other streams. Furthermore, the state man engaged in this two weeks project would be prepared to carry on and extend the work during slack seasons.

IV. PROJECT FOR THE NORTH-CENTRAL FISHING AREA (algae control in lakes).

The outstandingly pressing problem concerning this area is that of algae control in the lakes. This problem is so extensively treated in the reports by Mr. Hart and Dr. Prescott that all which needs be said in introduction is that we corroborate the view of these investigators and others regarding the vital importance of this problem.

For the summer of 1932 we strongly recommend that the investigation of this problem be continued, and that a start be made toward remedial action. In the way of investigation we suggest that Dr. G. W. Prescott be asked to return to the state for about 6 weeks following the middle of July, and that he be asked to provide answers as far as possible on three problems, among others which he may regard as pressing; namely:

- (1) kind of nitrogen combinations used by plants (very important in reference to sewage treatment);
- (2) life history of the obnoxious algae (importance in planning control), and

(3) possibilities of predicting some days in advance when the situation may become acute (so as to forstall same by treatment).

Mr. Purdy, an expert in such matters in the U. S. Public Health Service, might to good advantage be asked to cooperate with Dr. Prescott in the field work, and in the interpretation of results. Mr. W. P. Mark of the State Board of Health could to very good advantage again be associated with Dr. Prescott in this work.

General observation on the algae conditions should by all means be continued in 1932, because of the somewhat raised water levels.

In the way of remedial measures, we recommend the following:

(1) an attempt to introduce the alga-eating fish (gizzard shad) into at least one lake infested with these algae. Diamond lake is suggested, because the shad may here serve to feed the wall-eyed pike as well as keep down the algae. It would aid the experiment to allow this lake opportunity to build up a gizzard shad population before again using it for pike rearing. The lake should be kept under intermittent observation for three years at least before final judgment be passed on the success of the experiment.

We also recommend that at least one other algae affected lake be planted with gizzard shad this summer. A small lake or pond at Grinnell (Soft Water Co. pond) has been suggested. Further inquiries are being made regarding the suitability of this or other ponds or lakes to try out this promising possibility that this algae nuisance may be turned into a good purpose by transforming it into game fish through the intermediacy of gizzard shad. It should be retained in mind that this is an experiment which may fail. However, these are a series of facts which lead both Mr. Albert and us to think there is a good chance that the experiment may succeed.

Erosion control should be started in the hydrographic basins of the lakes, as farm land wash is perhaps quite as important, perhaps more so than sewage in creating the algae nuisance. As a minimum of erosion control in these lake drainages for 1932, we urge the control of perhaps the most pressing single source of erosion into the lakes, namely the inwash of the steep banks of Storm Lake. To this end we recommend, on the suggestion of Mr. Crane, that willow logs be embedded in the base of the banks, so these will sprout and produce a row of protecting willows. These in time will have the further advantage of beautifying the lake shore and of calming wind action in the mud-coated shallows.

One other contributing element in the algae production is held by the investigators to be that of cattle wading into the lakes, and remaining there for long periods in the critical period of hot weather. These cattle add nitrogenous matter which is not only

unsightly, but presumably also contributes to the algae nuisance. It would presumably be distinctly advantageous to fence the cattle off from the lake. We suggest that in 1932 a definite effort be made to strike an agreement with the farmers whereby a fence may be run some distance behind high water mark. It would need be placed there to avoid destruction by ice-shove. The farther back the fence could be placed on each shore-line the better, as this would allow a marginal growth of brush and trees--a decidedly desirable feature from the standpoint of beauty, game and wind protection to the muddy shoals of the lakes. If the cattle have no other access to water, the running of a small fenced enclosure into the lake might be considered.

IV Project for Southeastern Area — *hampering*
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V. PROJECT FOR THE SOUTHWESTERN FISHING AREA:

In the southwestern section of the state (extending also up the west side and the southeastern portion as well), the great fish problem is that of excessive variation in stream flow and tremendous silting. Some recuperation may follow from allowing the streams to revert to their originally meandering and snaggy condition. When consistent with farm interests, it would be well to start now an educational campaign leading toward this end. Some progress may also be made in improving these streams by introducing brush logs, hole-digging current deflectors, etc.; also old tiles for catfish spawning. What is done along these lines should be regarded as experimental, and kept under close observation.

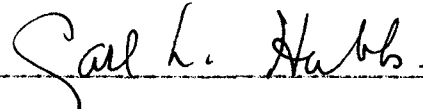
for final report 91 The prime possibilities of fishing betterment in the Southeastern Area is the construction of artificial lakes. These will also serve as means of erosion control, as centers of general recreation, etc. But their main value will probably be their fish resource. Therefore, great care should be taken to so construct these ponds as to make conditions suitable for fish. Important points to consider are:

- (1) Sufficient depth to support fish life in winter--preferably 15 to 30 feet at the dam.
- (2) An accessory drain at the very bottom of the dam, in the old stream bed, to make possible the flushing out of silt from the deepest part of the pond, so as to maintain the desired depth. This drain should be shielded on the upper side by a double screen, to save fish and to permit cleaning of one screen at a time.
- (3) Leaving Brush in the lake bed for fish shelter.
- (4) Cutting down trees that would be killed, removing larger log if desired, but wiring finer branches onto large branches and weighting these so they will lie just under the level where ice would ^{not} destroy them. These will provide very fine shelter for young fish, and also increase the food.

- (5) Stocking the ponds rather heavily with game and pond fish, particularly (and generally) with large-mouthed black bass, crappies, bluegills and the larger species of bullheads (not the dwarf black bullhead of the region).

Taking these precautions, the Fish & Game Department ought to insure a great increase in the fish supply of the state as these lakes are produced. And this increase will come in a portion of the state where better fishing will be a very valuable asset.

This report has been prepared at the request of Mr. Jacob L. Crane by the undersigned, on information furnished by and on consultation with various officials and investigators of Iowa.



Carl L. Hubbs, Director.

Report # 93.

October 1, 1931

Jacob L. Crane, Jr.
Wrigley Building
Chicago, Illinois

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FISH DIVISION

Dear Mr. Crane:

In response to your telegram of September 30, we submit the following
Report 93.—SUGGESTIONS FOR IOWA FISH SURVEY.

You ask for our advice on major elements we consider essential in a one-year survey of Iowa made to prepare program for developing "sportsman fishing". We assume from what Dr. Fish told us, that your survey will cover all branches of conservation, and that you will confer with Dr. H. H. Ellis of the U. S. Bureau of Fisheries, stationed at the University of Missouri (Columbia, Mo.), regarding the survey of fish and other problems of the Mississippi R. and adjacent sloughs and stream mouths.

I would suggest that in the game fish survey attention be divided along five lines, namely,

- (1) A preliminary lake survey.
- (2) A reconnaissance stream survey.
- (3) A fish-hatchery inspection.
- (4) A consideration of draining lands and impounding waters.
- (5) A consideration of stream pollution.

Time will be too short for more than rapid, extensive surveys. Many fundamental problems will necessarily, under the circumstances, be left undone, but should not be

forgotten in the drawing up of the final 25 year program. It would be folly to look upon the one-year survey as the investigation needed for the twenty-five year period of conservational development. The survey should suffice to show, however, along what lines it should be planned to continue investigations during the future, contemporaneously with and in association with the expanded administrative work.

(1) A PRELIMINARY LAKE SURVEY

To obtain an understanding of the problems involved in increasing the game fish populations in the Iowa lakes, we would suggest a preliminary survey along the lines which have been developed here in Michigan over the last two years. The urgency of continuing our work in Michigan would make it very difficult for us to spare one of our assistants for even part of next summer to engage in work on Iowa lakes. I have suggested to Dr. Fish, that Mr. Aitken, graduate student at the University of Iowa, be granted an appointment as assistant or fellow at say \$1000 or \$1200 to undertake training in the theoretical and practical sides of lake survey methods with us this fall, winter and spring, so he could be prepared to carry on the preliminary survey of Iowa lakes next summer, assisted by a party from the University of Iowa or elsewhere. He could then return in the fall to prepare his report under our supervision and with our help.

As I have tried to make clear to Dr. Fish, if this plan is agreed to, Mr. Aitken should come to Ann Arbor at the earliest possible moment (if he is yet available), so he can take part in some actual field work in southern Michigan lakes this fall.

The lake survey should involve determining for each lake: (1) the present fish fauna of the lake, the species present and the abundance of each - through collections and inquiries; (2) the history of fish and fishing in the lakes; (3) the abundance of food for fishes; (4) the presence of obnoxious fish and the need for their control; (5) the species which should be planted, and in what numbers; (6) the possibilities and needs for improving conditions for fish life, by the adding of weed beds, brush shelter,

spawning beds, etc.

(2) A RECONNAISSANCE STREAM SURVEY

This should involve a tabulation of the streams of the state, the obtaining through collections and inquiries of some knowledge of the present fish fauna, the importance of food and game fish in each stream, and the fish and fishing history of each stream. We could, if desired, identify the collections, and prepare a report on the fish fauna of the state, on the basis of the collections of the survey and of the records given in the published accounts, and we could assist in the reports on the streams which the one year survey was able to touch. We have in mind some college men in Iowa, and one or two now outside the State who formerly worked on the fishes of Iowa, who might be engaged at moderate expense to carry on the field work.

(3) A FISH-HATCHERY INSPECTION

A party of 5 to 10 scientific men and practical fish culturists, representing the U. S. Bureau of Fisheries, the Iowa Department of Conservation, and at least one other state should be engaged to make an inspection of the federal and state fish hatcheries of Iowa, and perhaps to inspect potential hatchery sites, and to arrive at a program for the improvement, expansion and coordination of the hatchery and rearing activities. The inspection would best be made next summer. We would be glad to nominate men qualified to take part in such an inspection.

(4) A CONSIDERATION OF DRAINING LANDS AND
IMPOUNDING WATERS

These two problems are, we suppose, of such vital importance to the game fish supply of Iowa that they should be kept in the forefront of attention. Just what effective field work could be done in one season we can hardly state. Such estimate should at least be obtained - perhaps from records already available, of what has been done to modify the waters of the State for better or for worse by these means.

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(5) A CONSIDERATION OF STREAM POLLUTION

We understand the Iowa State Board of Health has accomplished much in a survey of stream pollution over the State. This work should be actively continued, expanded if possible, summarized and considered in reference to the effect of sewage on fish life. The potential benefit of properly treated sewage to the fish productivity of waters should be kept in mind in the preparation of plans for sewage treatment.

INSTITUTE OF FISHERIES RESEARCH

Carl L. Hubbs
Director