MONTANA FISH AND GAME DEPARTMENT

FISHERIES DIVISION
Helena, Montana

JOB COMPLETION REPORT
INVESTIGATIONS PROJECTS

State of Montana

Project No. F-29-R-1 Name Evaluation of Ranch Pond Stocking Policy

Job No. I Title Evaluation of Results of Stocking Warm Water Fish

Period Covered: June 1, 1961 - June 30, 1962

ABSTRACT

The results of a survey of the physical characteristics of eastern Montana stockwater reservoirs made during the summer of 1961 are presented. Drought conditions existing over most of the area appreciably influence the results. Sixteen percent of the reservoirs inspected were completely dry. The remaining reservoirs had a mean maximum depth of 6.2 feet, and had an average surface area of 2.6 acres. Surface temperatures averaged 72°F. and decreased approximately 1°F per foot of depth.

RECOMMENDATIONS

It is recommended that the investigation and inspection of ponds planted from the Miles City Federal Fish Hatchery be continued as time permits. This work should be directed primarily at reservoirs accessible to the public, and be designed to determine which reservoirs possess potential to provide appreciable recreation and merit continued management realizing drought and winter kill will occasionally recur.

OBJECTIVES

To examine a number of ranch ponds stocked with warm water fish in 1956 through 1958, and to determine what portion of the ponds for which applications for fish were approved are actually suitable for fish, and to determine the success, in terms of fishing produced, of plants made in those ponds which are suitable for supporting fish life.

TECHNIQUES USED

One hundred reservoirs were selected at random from the files of the Federal Hatchery at Miles City, Montana. These were surveyed for gross physical characteristics during the summer of 1961. Data from 59 ponds was supplemented with owner interviews. Depth measurements were made using a sounding line. Areas were estimated from a sketch of each pond by the method of geometrical figures. A temperature series, consisting of a group of progressive temperature determinations by means of an electronic thermometer, was taken: (a) at the surface, (b) at each succeeding five-foot interval, and (c) at the bottom.

FINDINGS

Eastern Montana, located in the western semi-arid portion of the Great Plains, has extensive areas in which natural fish habitat is extremely limited. In an attempt to create

sport fishing in the area, warm water fish have been introduced into numerous artificial stockwater reservoirs. Largemouth bass (Micropterus salmoides) and bluegill sunfish (Lepomis machrochirus) are the species most commonly planted. These have been distributed through a cooperative program by the U. S. Fish and Wildlife Service and the Montana Fish and Game Department. Fish are requested by the landowner on an application form furnished by the U. S. Fish and Wildlife Service. After approval by that agency and by the Montana Fish and Game Department, fish are provided by the National Fish Hatchery in Miles City, Montana. Nearly all applications in recent years have been approved without field inspection of the ponds due to the impracticality of on-site inspections. Information on area and depth provided on the application form have been assumed to be correct.

Previous studies on Montana stock ponds include: an investigation by Brown and Thoreson (1) in 1949-50; and a Southeastern Montana fishery study series conducted by Whitney (2,3).

Drought conditions dominated the weather during the survey period. These conditions had prevailed for two or more years in many of the localities investigated.

The reservoirs examined in this survey are normally located on the main stem of a dry coulee system. Primary source of water is runoff following the melting of accumulated snow or heavy rain off a drainage area of about one square mile. The surrounding country typically consists of rolling hills cut by deep gullies. Usual cover is a sagebrush-grass combination; trees and shrubs are virtually non-existent. Dams are of a dirt fill type extending directly across the main channel of the drainage system. These range from 14 to 30 feet in height. Bottom deposits are: muck, gumbo-sediment, or a combination of both, in a layer six inches to several feet deep.

Pollution is primarily from livestock and soil erosion. Water color and turbidity are largely related to these and, in turn, determine the type and amount of production in a given pond. As a rule, the water is: (a) light brown, highly turbid, in the silt polluted areas; (b) dark-brown, slightly turbid, in organic polluted areas; or (c) colorless, slightly turbid in "unpolluted" waters.

Due to drought conditions under which the survey was conducted, measurements of characteristics existing at the time of survey should be considered minimal. Sixteen percent of the reservoirs inspected were completely dry. The remaining reservoirs had a mean maximum depth of 6.2 feet and a range of 2 to 15 feet. Eighty-three percent of the reservoirs lay within the 2 to 11 foot range. The 6 and 8 foot depth groups comprised 34 percent of the total.

The maximum potential depth of a reservoir is considered to be the vertical distance from the lowest portion of the reservoir basin to a point corresponding to the crest of the spillway. This represents a depth attainable only during periods of optimal runoff. Measurements for 87 reservoirs were interpolated to $\pm$ 2 feet by combining maximum depth measurements with estimates of water surface to spillway crest heights. The mean maximum potential depth was found to be 14.6 feet and to lie within the range of 5 to 28 feet. Eighty-six percent of the measurements were distributed somewhat normally over a range of 5 to 20 feet in depth.

The hypothetical mean depth is an approximation based upon the average of the depth at the time of inspection, which was considered the minimal depth on the maximum potential depth. Although the validity of such an approximation remains to be tested, the results appear reasonable and could serve as a guide, if used along with existing annual precipitation data. These estimates also provide a more realistic comparison with owner depth estimates. Estimates of the hypothetical depth yielded a range of $3\frac{1}{2}$ to $21\frac{1}{2}$ feet and a mean depth of 10.4 feet.

Owner depth estimates were taken directly from the application forms submitted by the owner in his request for fish. Compilation of applicant measurements resulted in a mean depth value of 13.7 feet. The range was 6 to 22 feet with 74 percent falling within the limits of 10 to 15 feet. Thirty-four percent of the applicants gave the pond depth as 12 feet.

Stock reservoirs at the time of inspection averaged 2.6 acres excluding 13 dry ponds. This compares well with estimates of maximum potential area, which had a mean value of 2.9 acres. The distribution is weighted toward the smaller ponds in both cases. Owner estimates of area averaged 6.5 acres in a range of from 3/4 to 50-60 acres.

Temperature measurements were made in each pond in the region of maximum depth. Surface temperatures remained relatively constant throughout the summer; averaged 72°F. within a range of from 80 to 64°F. Water temperatures generally decreased 1-2°F. per foot of depth. Only three thermoclines were encountered during the survey. The stratification was somewhat unusual in that the thermoclines were located at the surface. This condition appears to be related to cloudbursts in the area, which introduced a charge of cold water into the warm reservoir water.

Literature Cited

1. Brown, C.J.D. and N. A. Thoreson. 1952. Ranch fish ponds in Montana. In Symposium on Farm Fish Ponds and Management, J. Widl. Mgmt. 16: 275-278

2. Whitney, Arthur N. 1952, Southeastern Montana Fisheries Study. Federal Aid in Fish Restoration Quarterly Progress Report. 1: 48-56.

3. Whitney, Arthur N. 1953. Southeastern Montana Fisheries Study. Federal Aid in Fish Restoration Quarterly Progress Report. 2: 49-59.

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