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YEARLY ACTIVITY SUMMARY OF LEONARD N. ALLISON,

FISH PATHOLOGIST
December 31, 1947
by

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The duties of the fish pathologist for the year of 1947 included biological investigations of lakes and streams in Fisheries District #5, and study of fish disease in nature and at fish hatcheries throughout the state. For clarity, this report will treat the two activities under separate headings.

Biological investigations.--Oxygen determinations of water in the Grayling Winter Sports Park ponds were made at various intervals during ice cover to determine whether minnows could be held overwinter in the ponds without danger of suffocation from lack of oxygen. The last analysis was made on March 6, at which time oxygen content was still satisfactory.

Reconditioning of Institute's Au Sable long boat was supervised.

Observations of fish life through the ice were made on the Grayling Power Dam, Au Sable River. Observations made by local sportsmen of brook trout up to three pounds in weight were not verified.

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Sucker Lake, Montmorency County, was investigated for management program. Collected fish and sounded lake in February. Fish collections and temperature series and chemistry analysis were made in August, 1946. Recommended dam in outlet to restore lake to former level, and poisoning to remove large predacious fish, followed by a program of stocking with legal-sized brook trout.

Rough fish spearing parties were organized in April with local conservation officer and sportsmen.

Conducted spearing party on Bear Lake, Kalkaska County in May to collect common suckers and Necturus (mud puppy) to check for predation of rainbow trout eggs. Trout eggs were found in the stomach of one of 15 suckers and none in over 50 Necturus collected.

Photographed dams at McCormick Lake, Montmorency County; Foote Dam, Au Sable River; Reedsburg Dam, Muskegon River; Fletcher Floodwater Dam, Thunder Bay River; Crystal Lake Dam, Benzie County; and dam at mill in Spring Creek, Iosco County. Also photographed Duck, Glory and Bright lakes from airplane to supplement studies being made on those lakes. Other photographs were made of various lakes in District #5.

All streams from Bay City to Alpena were checked during April and May for presence, abundance, and location of sea lampreys.

Assisted in tagging and planting trout in the Boat v.s. Spot Planting experiment. Three groups of 300 trout were tagged and planted in the Au Sable River near Grayling during the summer months.

Made partial surveys on the following lakes to check progress of experimental management program on some and for information regarding formulation of management plan on others:

Crawford County: Lakes Margarethe, Shellenbarger, Glory, Bright, Timber, Barnes (Loon), Clear, K.P., River and Duck.

Rosecommon County: Higgins, Houghton and Dunham lakes.

Montmorency County: North Blue, Big Wolf, Avalon, Avery, Lake 15 and Sucker lakes.

Oscoda County: Twin Lakes, Bird, Gopher, Mack, Muskrat, Indian and Oak lakes.

Gladwin County: Trout, Hoister and Streaked lakes.

Ogemaw County: Clear Lake.

Kalkaska County: Starvation (Hiawatha) and Bear lakes.

Checked spring hole in West Branch holding pond for trout with electric shocker from Hunt Creek Station. Only a very small number of trout were found. When this former bluegill pond was drawn down for the removal of the trout it was suspected that the spring hole might retain a considerable number of trout.

Pathological Investigations

Oden Hatchery.--January 7, investigated loss among clipped brook trout. No disease organisms could be found. Cause of loss was not determined. Loss abated within one week.

No other unusual mortalities were reported from this station.

The parasitic copepod has been present on brook trout at Oden Hatchery for many years, and has resisted all efforts to eradicate it, including complete sterilization of the unit. No plans of the station are available that show all drainage pipes from an adjacent swamp in which trout infected with the copepod are known to exist. These wild fish apparently have access to the waste ditch paralleling the pond system and which also helps to supply the lower system of ponds. An

efficient barrier was installed at the lower end of the waste ditch to prevent wild trout from ascending it, thus preventing infection from this source. The electric shocker was used in May to remove all fish from the waste ditch. A number of these fish were found to be infected with the copepod. In August, 300 eighteen-month-old brook trout in the ponds below the entry of the waste ditch were examined and a 15 percent infestation of copepods found. A number of smaller trout held in raceways above the entry of the waste ditch were examined and no copepods found. Eradication of this parasite from the Oden Hatchery would require complete sealing of the ponds and waste ditches to prevent entry of infection from the adjacent swamp, and removal of all brook trout over three inches long from the hatchery for a period of at least one month. At present, infected trout are held in the lowest ponds in the series, but apparently merganser ducks may carry these fish to upper ponds, since fin-clipped trout which were held only in the lower ponds were found scattered throughout the upper ponds. Great care must be used in distributing brook trout from Oden Hatchery to prevent the introduction of this parasite into waters known to be free of infection.

Wolverine Rearing Ponds.--This station has a past history of infection by a bacterium causing furunculosis, or boil disease, among brook and brown trout. This year occasional doses of sulfamerazine aided in preventing excessive losses and no epidemics were reported.

An increasing daily loss was noted during the first two weeks of December among brown and rainbow trout. Examination revealed a condition known as a fatty degeneration of the liver caused by cold water and a diet lacking in fresh meat. Recommended no feeding for one day, followed by a reduced diet of fresh meat. The following week, the supervisor reported loss abating satisfactorily.

Thompson Hatchery.--Examination of brook trout at Unit #2 in February confirmed Mr. Scully's diagnosis of furnuculosis. A three-week treatment with sulfamerazine proved effective in reducing the loss to normal. In the past, difficulty with Octomitis was experienced when fry from Unit #2 were transferred to outdoor ponds at Unit #1. The loss was reduced this year by holding the fry in indoor troughs for several weeks at Unit #1 and treating with carbarsone in the diet for a period extending for a short time after transferring into outdoor ponds.

Wolf Lake Hatchery.--Mortality among rainbow trout fingerlings in June was investigated. Octomitis was demonstrated, complicated by fungus and excessive mucus on gills. Recommended treatment with carbarsone for Octomitis and salt bath to remove mucus from gills. No further reports of loss were received.

Benton Harbor Rearing Ponds.--A heavy mortality among fingerling brook trout occurred during July. Fungus and Gyrodactylid worms were found on the fish. The fungus and the worms could have been eliminated but due to the construction of the ponds and abundance of weeds therein, no treatment was possible. The ponds were built to rear warm-water species of fish and are poorly adapted to trout culture.

Paris Hatchery.--A condition of pop-eye among discarded brood stock of brown trout in July was investigated. No disease was found. The condition was apparently caused by rough handling during fin-clipping operations performed without benefit of anesthesia.

Baldwin Rearing Ponds.--A peculiar type of blindness among brook trout developed again this year. It was first observed here during 1946. The crystalline lens of the eye becomes opaque and very soft, and the fish assumes a very pale or grayish color. Normally, fish becoming

blind due to injury or parasites turn dark colored. Blindness caused by diets high in pork content has been experimentally demonstrated, but the diet at Baldwin was not thought to contain excessive quantities of pork. Later investigation revealed that considerable amounts of pork had been fed. The fish were fed for two weeks on a diet containing 5 percent of Brewers' yeast (vitamin B) since the pale color indicated a contraction of the melanophores and it was hoped that the vitamin would supply a needed dietary deficiency. No change was noted after two weeks on this diet and it was discontinued. The trout were transferred to Paris Hatchery for rearing and complete change of water supply. Very little improvement was noted after six months at Paris Hatchery. A similar condition of blindness was encountered at the Platte River Station and will be discussed under that station.

Another disease affecting brook trout that defied control methods in 1946, appeared again this year in April and persisted for several months. The disease is a type of blood septicemia, with symptoms resembling those of furunculosis, but resists treatment with sulfamerazine, the only drug known to control furunculosis. A bacteriological study of this disease was not possible due to lack of time for laboratory work. It is hoped that a thorough study of this disease can be made in 1948.

Harrietta Hatchery.--In April, a loss among brook and rainbow trout fry was experienced. Examination showed damage to the gills of the fish, with possible involvement of gill disease among the brook trout. A change in diet from 100 percent horse hearts to 50 percent horse hearts and 50 percent horse livers was recommended. Subsequent improvement was noted, although recovery was slow. There had been heavy rains prior to onset of the mortality, during which time abundant particulate matter

filled the water in the troughs, apparently causing some damage to the gills.

For the past several years excessive losses have occurred among adult brook trout during the spawning season because of injury inflicted through fighting among the males and redd-making activity resulting in heavy fungus infections. In an attempt to alleviate the trouble, this year an experiment was set up to attempt to suppress the spawning urge by modification of the normal daylight-darkness intervals. Earl Hoover and H. E. Hubbard induced brook trout to spawn from one to four months early by shortening the daylight interval more rapidly than normal. On the basis of that study, the present experiment was planned to prolong the period of daylight by the use of floodlights to be turned on daily at 5:00 a.m. and to burn at night until 10:00 p.m. Due to difficulty in procuring equipment the experiment was incompletely staged this year and only slight suppression of the spawning urge was noted. It is planned to repeat the experiment with proper equipment in 1948.

During August a mortality developed among brook trout, apparently caused by furunculosis. A four-day treatment with sulfamerazine proved effective.

A severe anemia among yearling rainbow trout became apparent through increased losses in December. A diet of fresh meat was prescribed. Red blood cell counts will be made at intervals to check the effect of the change in diet.

Platte River Rearing Station.--A condition of blindness and pale body color among brook trout, identical with that at the Baldwin Station, was reported and observed in May. The entire lot of affected fish were transferred to the Harrietta Hatchery, distributed in three ponds and

put on experimental diets. Pond #14 received horse liver, Pond #14 received pork melts and cereal, 50-50, and pond #18 continued on the diet as fed at the Platte River Station. These diets began in June and continued until December, when the experiment was concluded. Definite improvement was noted in the lot on a diet of horse liver. Least improvement was noted in the pond continuing on the same diet. In many cases, however, deterioration of the lens of the eye had progressed beyond any possibility of recovery.

Harrisville Hatchery.--Gill disturbance caused extensive mortality in May among rainbow trout fingerlings transferred from Harrietta Hatchery. All efforts to control the loss were unavailing. The fry were of the lot from Harrietta that had been subject to roily water and subsequent mortality during April.

In 1946, rainbow trout held in two large rectangular ponds developed blindness from massive infestations of the crystalline lens by the cataract worm. This worm reaches adulthood in herring gulls; eggs are dropped in water, hatch and penetrate Lymnaea snails. Larvae (cercariae) leave the snail, burrow into trout and migrate to the crystalline lens of the eye, rendering the lens opaque and causing blindness. The ponds contained large population of snails. Control was effectively applied by killing all snails with a treatment of copper sulphate and hydrated lime. Since snails will undoubtedly repopulate the ponds, the ponds should be inspected each year before trout are stocked, and treated to kill snails if necessary.

Grayling Hatchery.--Sulfamerazine was used to control outbreaks of furunculosis on eight occasions. Since, because of the spotty nature of the attacks and the lack of space, it was impossible to separate the affected fish into different ponds so that one could be used for a control,

definite proof that treatment with sulfamerazine was beneficial is lacking. However, in every case recovery of the sick fish was noted within four days after the beginning of the treatment. Treatment with malachite green was given at various times during the summer months when fungus (Saprolegnia) appeared on the fish.

An experiment to test the possibilities of using small, daily doses of sulfamerazine as a prophylaxis against furunculosis was conducted using three grams of the drug per 100 pounds of food fed to brook and brown trout. At the end of three months the known loss from the two ponds receiving sulfamerazine and the two control ponds was summarized. The loss among brown trout was low in both ponds, but the pond of brook trout under treatment lost only about one-third as many trout as the control pond. Mortality from sulfa poisoning was not evident in either treated pond. Further studies of the prophylactic possibilities of sulfamerazine are to be made.

Self-cleaning, rotary screen.--Considerable time was expended on designing and testing a self-cleaning, rotary screen for use in hatchery raceways and in weirs for studies on streams. Mr. James Alexander built the pilot model at the Conservation Department Forest Fire Experiment Station at Roscommon and installed it at the Grayling Hatchery where it operated under observation. The unit consists mainly of an undershot paddle wheel enclosed by a cylindrical screen, the screen geared to rotate in opposition to the paddle wheel. Stream current offers motive power for the paddle wheel, causing the screen to turn against the stream, thus lifting debris over to the downstream side, where it is washed off by the water flowing through the screen. The sides and bottom of the unit are suitably sealed to prevent passage of fish. Units are now being installed in Hunt

Creek at the Hunt Creek Experiment Station where weirs for the study of fish movement are in constant operation.

Fish Mortalities on Lakes and Streams

Fremont Lake, Newaygo County.--A mortality among crappies, perch and bluegills occurred in January and was investigated on January 17, with Mr. J. T. Wilkinson, Regional Fisheries Supervisor. Snow covered most of the ice at this time and only several crappies were seen lying nearly helpless against the under side of the ice. No specimens were collected. Oxygen content of the water was adequate to support fish life. Cause of the mortality was not determined. Pollution from a packing plant a short distance up the inlet was strongly suspected, although proof of this was not obtained.

Mud Lake, Roscommon County.--February 17, due to a past history of winterkill because of oxygen depletion, interested sportsmen had piped a small stream of spring water to the lake, in spite of assurance by Mr. H. L. Peterson, District Fisheries Supervisor, that it would be of little benefit. Water at entrance of spring water tested 5.0 p.p.m., and under ice near center of lake, 6.9 p.p.m.

Lagoon in Cadillac Lake, Wexford County.--February 26, March 6 and April 1. Past history of winterkill in this lagoon caused criticism by sportsmen of construction of state highway causeway which was blamed for preventing circulation of water to prevent oxygen depletion in lagoon. Oxygen tests this winter demonstrated adequate oxygen content and a prediction of no winterkill was made, and later confirmed when the ice cover melted.

McCoy and Dixon Lakes, Otsego County.--March 24. The lakes are connected by a small culvert now which partially blocks water movement between the two lakes whereas a wider connection existed prior to improvement of the county road crossing the culvert. Mr. McCoy complained that the culvert restricted movement of fish and prevented circulation of water, causing a winterkill in McCoy Lake. Oxygen content of Dixon Lake was 11.0 p.p.m. and McCoy, 0.2 p.p.m. Corrective measures are to be determined by proper authorities at a later date.

Crystal Lake, Benzie County.--July 10. Investigated mortality among smelt. Thorough external and internal macroscopic and microscopic examination failed to demonstrate any cause of death. The shape of the pupils of the eyes appeared aberrant and sections of the eyes and brain are to be made for a possible clue to the cause of death.

Reedsburg Dam, Muskegon River, Roscommon County.--Investigated mortality among pumpkinseed sunfish, bluegills and rock bass which occurred in weed-choked backwaters of the dam. Cause of death not apparent but may have resulted from low oxygen content at night because of consumption of oxygen by plants at that time.

Investigated report of leeches and lampreys on bass and suckers below dam, but none were observed on the date of investigation.

Cut Stream at Houghton Lake, Roscommon County.--October 3. Investigation of report of dead game-fish-young turned out to be a small number of dead minnows, one inch maximum length.

Pleasant Lake, Wexford County.--October 20. Small mortality among common suckers investigated. Only one specimen was found but it was in an advanced state of decomposition, which made autopsy impossible.

Specimen preserved by Mr. Stanley Lievens, District Biologist, contained

one very large larval tapeworm (Ligula), which may have contributed to the cause of death. No cause for this mortality was found.

Long Lake, Ionia County.---June 22. Investigated moderate mortality of of rock bass, bluegills and largemouth bass. No fresh specimens for examination were found. Cause of mortality not determined.

Complaints of bait dealers from Houghton Lake, Roscommon County; Lake Margarethe, Crawford County; and Manistee Lake, Kalkaska County, of excessive loss among minnows in their tanks were investigated and recommendations made.

Study of Disease of Northern Pike in Fletcher Floodwaters,
Montmorency and Alpena Counties

Northern pike in Fletcher Floodwaters are infected with a disease greatly resembling "Red Sore" disease of pike reported in Canada. Specimens of diseased pike were collected for photographing and study. The causative bacterium is said to be identical with that causing red-leg in frogs. Frogs of several species were held in the laboratory and their legs inoculated with puss from diseased pike but no infection developed. Future study will include bacteriological study of the disease and continued attempts to infect frogs and in other ways to definitely determine the cause of this condition in pike in these waters.

See letter from
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Dynamiting experiment

August 30. Assisted by Biologist Paul Eschmeyer and Conservation Officer Clarence Roberts, trout and suckers were purposely dynamited for study of the effects of dynamiting on fish. The effects were tabulated and a joint report was written. This information was used

in the examination of fish suspected of having been dynamited and subsequent positive testimony in a circuit court case (Bloomberg case) in Bessemer on November 5th. In the future, another test dynamiting is planned in which fish will be held at various known distances from the blast, and those not killed immediately will be held under observation for possible delayed effects.

Summary

There is a definite need for more detailed study of fish disease in Michigan from both a practical and an academic aspect. A survey of the parasites of fishes and their distribution would serve the practical function of preventing unintentional transfer and introduction of parasites into uninfected waters. One parasite, the bass tapeworm, may be an important factor in limiting the production of bass in lakes because the larvae have a predilection for the reproductive organs of the bass, sometimes rendering the fish sterile. Attempts are to be made to rear uninfected bass in the bass rearing ponds of the state in 1948. Since the first of the two larval stages is carried by a free living copepod, the water source of the rearing ponds must be free of infected copepods. This parasite is already known to be firmly established in many of our lakes, but having a stock of uninfected bass on hand would permit introduction of uninfected fish into new waters.

The cataract worm, a trematode, is found in the crystalline lens of a high percentage (90 percent) of common suckers in some lakes, causing varying degrees of blindness depending upon the number of worms present. This worm also attacks the eyes of rainbow trout. In Bear Lake, Kalkaska County, in which rainbow trout are being stocked, a high percentage of the suckers are affected. The biology of the trout and the parasite is

such that chances for infection appear to be small. The parasite is spread by infected snails from June to September in shallow water. At this time of the year trout seek the deeper, cooler waters and do not spend much time in shallow, warm water where snails are most frequently found. However, blindness of rainbow trout may be more common than is suspected at the present time. Blind trout would not readily be caught by the usual angling methods and thus might have escaped notice by interested sportsmen. It is doubtful whether blind trout can avoid starvation in situations outside of hatchery ponds. This year, approximately 4,500 blind rainbow trout were stocked in Timber Lake, Crawford County, to determine whether they would survive. Specimens netted two months after planting were in very poor condition. The lake will be netted in 1948 to make further studies of this condition.

A thorough bacteriological study should be made of trout inhabiting streams supplying trout hatcheries and rearing ponds to determine the incidence of furunculosis in wild fish. Infected wild fish may show no symptoms, but act as carriers of the bacterium and contaminate the water supply. Furunculosis is endemic at the Grayling and Wolverine Stations. In 1948 a bacteriological study will be made of brook and brown trout from the Sturgeon River and the East Branch, Au Sable River, which supply water to the Wolverine and Grayling stations, respectively, to determine whether wild trout are carrying furunculosis, thus constantly infecting the water supply. Similar studies will be made at other stations as time permits.

The study of fish blood as an aid to diagnosis of pathological problems at fish hatcheries in Michigan has been neglected in the past. This year the technique was developed and in the future will be employed in routine examinations of sick fish.

A system of reporting to the pathologist fish losses in hatcheries and treatments given is to be formulated to enable the pathologist to keep informed of current diseases and to compile disease histories for each station. These records will also be useful in determining the quantity of chemicals to keep on hand for distribution to hatcheries as needed.

Bacteriological study requires much time in the laboratory and has been neglected because of the necessity of numerous and frequent field trips. There is more than enough work to be done to keep a technician busy full time in the laboratory on procedures involved in prosecuting bacteriological, parasitological and histological studies of fish disease in Michigan and maintaining adequate records of the studies. Diagnosis of fish disease and application of control measures at hatcheries must be completed quickly if the loss of fish is to be kept at a minimum. With one person to make field investigations and maintain a laboratory concurrently, the work that can be successfully undertaken is limited considerably.

INSTITUTE FOR FISHERIES RESEARCH

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