STATE OF MICHIGAN.

FIRST REPORT

OF THE

STATE COMMISSIONERS

AND

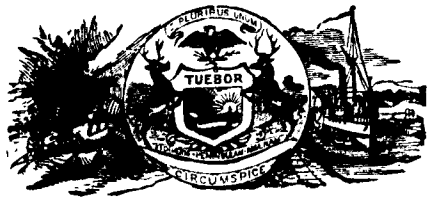
SUPERINTENDENT,

ON

STATE FISHERIES,

FOR 1873-4,

ENDING DECEMBER 1ST, 1874.



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REPORT OF THE COMMISSIONERS.

To the Honorable the Legislature of the State of Michigan:

The undersigned, Commissioners appointed under Act No. 124 of the Laws of 1873 present herewith the first Annual Report of Fish Culture in the State.

Being the first Report, we have gone carefully into detail, deeming these details of importance to you and to the people. We believe the successful breeding of fish by artificial means, and the acclimation of foreign varieties in our waters, as no longer an experiment. If our experience in the past should be confirmed in the future, our inland waters and great lakes in a very short time can be converted into sources of great wealth to the State, and of profit and pleasure to our people.

Our labors have been constantly lightened by the cheerful and gratuitous aid of our citizens everywhere. If your honorable body should see fit to continue the work entrusted to us, we are of the opinion that an appropriation of the same amount heretofore granted will be sufficient.

All of which is respectfully submitted.

Lansing, Dec. 1, 1874.

GEORGE CLARK,
A. J. KELLOGG,
JNO. J. BAGLEY,
Fish Commissioners.

REPORT OF THE SUPERINTENDENT.

To Hon. John J. Bagley, Governor of the State of Michigan:

An Act of the last regular session, No. 124, creating a Board of Fish Commissioners, makes it the duty of the Superintendent of Fisheries of the State to report upon the "results and successes of their work;" by virtue of this requirement I have the honor to present herewith the following Report:

Fish Culture, a comparatively new industry to the people of Michigan, is not new in the civilization of the old world, nor is it any longer an experiment with many of the States of our own country. And yet with no people or age has the subject received that measure of attention commensurate with its desired and easily attainable results. For what purpose our earth is sea-girt, why bays and gulfs on all sides indent and limit the land, why lakes and lakelets everywhere abound, and why innumerable rivers and rivulets thread their devious courses through all lands and climes, become, in the progress of this rapidly developing interest, salient points of inquiry. It must be obvious to even a tardy thinker that the waters are not exclusively for the keels of commerce, nor simply a means of intercommunication by peoples and States, nor yet to point a landscape and gladden the soul of fane worshiper and artist. These and kindred uses and purposes they undoubtedly subserve, while another and a higher mission they as certainly unfold. As vast garners for the unlimited supply and sustenance of a world rapidly advancing in population, they magnify the wisdom and goodness of their Creator. Except by study and research scarcely any idea can be formed of the vastness and diversity of water life. All waters, salted and unsalted, as they exist in a state of nature, before the supposed needs of art and manufacture poured their floods of filth and poison into the once pure waters, to contaminate and destroy, literally swarm with valuable life; so that their very motion and sparkle seems but the product of a sentient existence and activity.

And as experiment and discovery tear away the rubbish of the centuries, opening up to science a clearer field for its investigations and classifications, more and more of this water life is ascertained to be both palatable and nutritious, adapted and doubtless intended to supply those new and increasing demands necessitated by the world's growth in wealth and population.

This source of food supply, till within a very few years, has been almost a *terra incognita*. The land has been the constant beneficiary of all those arts and discoveries of an advanced and a still advancing culture, so that its yield in cereals and food production is greatly in excess of former periods, while the water, forgotten, neglected, to-day yields scarcely any larger or better returns than it

d before the revival of those inventions and discoveries which have so opened p a new world in industrial art and science. Now, this can be and is being medied. The water world, subjected year by year to new discovery and to a rger development, may be implicitly relied upon in the years to come to contribute a much larger quota of food than any pre-existing period. This, as iewed from the fish culturist's standpoint, is believed, not to be merely possible, but highly probable. Indeed, this is the fish problem, nothing more, othing less. And to the solution of this problem the veteran band of fish culrists, with the appliances at hand, and with a will and courage equal to every onceivable emergency, have gone to work, resolved not to lay down their tools ll every promise of theirs is redeemed and every prophecy fulfilled.

Before entering upon a recital of the work of the Commission, one or wo questions of a practical nature naturally arise, and need to be briefly onsidered.

And, first, can river and rivulet, lake and lakelet, and the sea itself, become lepleted of its natural full fish supply by the ignorance, improvidence, or the reed of men?. Conceding this, can they be restored to their former abunlance and fruitfulness by any reasonable expenditure of labor and money? And is fish culture, or aquaculture, using them as interchangeable terms, practicable and desirable, and, if so, is it an enterprise or industry of such alue and magnitude as to evoke the aid and guidance of Legislatures, State nd National?

A brief consideration of these questions in their order I deem important, as hey are the foundation upon which the entire superstructure rests.

That waters once abounding with fish can become barren by excessive, or ill-timed, or barbarous fishing, or all together, is too obviously, painfully true. Too many lines and rods and anglers behind them, from every part of the country, tell the one story in verification of the fact,—a class of witnesses not easily impeached. Go where we will, lakes, streams and rivers, which scarcely a generation ago gave great joy and profit to riparian owner and general angler, now scarcely excite their thought or notice. In the times of our fathers these same waters swarmed with the choicest varieties of fin life, contributing a no scanty support to many a pioneer and frontier home. Fish food constituted much of their living, and on that they placed great reliance and felt secure. Indeed, the story of the catches of those days partakes of the supernatural and fabulous. In well-authenticated history (Puritan history) are found such excerpts as the following:

"Two men in two hours' time took above ten thousand alewives without any weyre at all, saving a few stones to stop the passage of the river."

Another says, "At one draught they have taken one thousand basses, and in one night twelve hogshead of herring."

Another (adopting his quaint orthography): "I myselfe at the turning of the tyde have seene such multitudes passe out of a pounde that it seemed to me that one might goe over their backs drishod."

Now, why are not such or similar catches reported in the "tracts" and papers of to-day? Ignorance, improvidence, living out the proverb, "After us a famine"—fishing in season and out of season, but oftener out of season—not knowing the significance of close times nor caring—a waste by which the very air is become offensive—manuring lands with food fishes—emptying the vile refuse and poisonous filth of mill and manufactory into the once mirror-reflecting waters, alas! these are the answer. From such cause or causes have come

the deterioration of our fisheries, and that impoverishment, in many cases amounting to almost entire destruction, of those waters which once, and that, too, within the memory of men now living, abounded with the royal Salmon, the unrivaled Trout, the silvery Shad, and the gameful Bass. "'Tis true, and pity 'tis, 'tis true."

Now, can the ground so lost be recovered? Can these wastes be again restored and fertilized, and those waters, many of them still pure as when they first started their sinuous journeys to the sea, repopulated? Seventeen States of the country, speaking through their Legislatures, have already answered the question in the affirmative, and more than twice seventeen Commissioners, as intelligent and patriotic a corps of men as any enterprise may command or has need of, report to their Legislatures that the work steadily and hopefully progresses. Experiment and science, summoned into the service by the National authority, are not simply at work on the problem, but are daily giving proofs of not alone the possibilities of success, but of a success that approaches full and desired consummation. All the evidence is to the effect that the impoverished waters are being replenished with many of the choicest varieties of edible fish, and that the labor and expense contingent on this result bear no alarming proportion to the certain benefits and outcome of the undertaking.

Fish culture being so established, the question very naturally arises, is the cultivation of our waters practical and desirable, in such sense and degree as to entitle it to the position and rank of an industrial department of the State?

An augmented food production by any and all the means at the command of any people or government is a consideration of primary significance, since the question of cheap and wholesome food underlies nearly all our enterprises, private and public. By it capital and labor are not alone affected, but the growth and stability of human society, as evidenced in numerous cases at diverse periods of the world's history, are in no trifling measure dependent upon the food question.

Can fish culture, even as now understood and practiced, assure an increased food production? Of this there can no longer exist a remaining doubt. In the ordinary course and appointments of nature, it is asserted by men every way competent and qualified to pass judgment in this matter, that not five per cent of fish ova laid in the natural way become living fish, while perhaps not one per cent ever reach maturity. At the State Hatchery, last spring, not less than ninety-seven per cent became living fish. And if a percentage of seventy, eighty, or ninety is not secured the pisciculturist scolds his luck, and if a modest man, as most of his profession are, he is apt to entertain the belief that he has mistaken his vocation. Here, then, by the helps of modern art and science, is an increase in fish food supply of eighty or ninety, or even a larger per cent. A fact eminently worthy the notice of both philanthropist and political economist.

Fish, when left to the natural ways and methods of propagation and increase, are like the wild rice or maize, which in their natural state and growth do not yield a supply of food sufficient even for those nomadic and savage tribes that roam at will through the districts where they grow. Yet the former, wild rice, when protected and cultivated, is made to feed a tenth part of the world, and the latter, as rescued from its wild state and brought into a state of cultivation, has increased its yield a thousand fold, growing to such proportions and magnitude as to be the subject of "corners" in the commercial marts of the world,—a very king among the cereals. So fish, when

removed from those discouraging and baneful influences that interfere with their growth and increase and are placed under healthful conditions, protected from disturbance, allowed to breed unmolested, their young guarded from injury, their growth assisted by artificial means, will increase in a scarcely less ratio than the wild rice and maize, instanced above. Art, science and culture are the animating causes of these wonderful results. The water in the years to come may present such tables of statistics as shall compare favorably with our Agricultural and other industrial Bureaus, for in this as with the land there is no known limit to the achievements that may be wrought by the hand of scientific and earnest culture.

In another view is this increased food production from the water of great benefit. It permits rest, albeit but partial and insufficient, yet highly beneficial to the land. Then, again, this augmented food supply from the water is nearly a net gain in the sum total of production and wealth, since it is obtained at a mere nominal cost, as the fish secure, without expense or labor, their living and growth from the great pastures and meadows of the lake and the sea, the yield of which is of no special profit or benefit, save in the fish harvests which accrue. All other crops, all other production, involve labor, time and outlay of means, oftentimes to nearly the full market value of the article or thing produced, whilst this, to a large extent, is self-producing, requiring only a little oversight and the passage and observance of some restrictive regulations, all of an inexpensive character, to secure a yield, taking into account labor, time and outlay, far in excess of every other department of art or industry. So we infer from every point of view,—private, public, State, National,—as food producer, food cheapener, as factor in the creations of capital and labor, as an element of material growth and progress, opening up a new and wider sphere of thought and activity, inciting all classes to a labor and husbandry congenial to the taste, conducive to health and promotive of a social habit and order typical of the reign and triumph of the arts of peace, and universal good neighborhood, in all these respects, and indeed in every phase in which the subject may be regarded, this fish movement and enterprise, to which not alone individuals, neighborhoods, and whole communities are turning their attention, but to which the General Government, and seventeen of the States, as well as the most enlightened and progressive of foreign countries and governments, are actively committed, is eminently worthy the place accorded it in the legislation and administration of the State, and we think at no very distant day is certain to achieve a deservedly high rank with those other industrial interests and institutions which so plainly denote a material, physical and moral progression in advance of all former periods and civilizations.

We now come to Michigan as a fish State, and here we find a natural mine of wealth and resources well calculated to awaken the pride and gratitude of all her people. No State of the entire thirty-seven exceeds, nor indeed equals her in her natural fish supply and advantages. Her lake coast is more than 1,400 miles long, and the computed area of water surface within her constitutional limits is 36,324 square miles. A broad and beautiful peninsula (and when the ship canal, an event not improbable, shall mark her southern boundary, an island), her geographical position on the fish map of the country, as well as her physical constitution, are all that can be desired. North, east, and west, she is bounded by a chain of lakes the largest and grandest that exist on the globe, which lakes in the new nomenclature probable on the more full and

perfect establishment of fish industry, will be known as the great *unsalted* seas, and so Michigan will pass to a *sea*-board State, clothed with such honor and profit as in the esteem of the sister States attach to her new condition. Not only are her bordering waters very seas in magnitude and in the variety and choiceness of their productions, but in the number and value of her inland waters also no equal area of territory throughout the entire Union is before hers. Scarcely a section of her fifty-six thousand two hundred and forty-three square miles that is not bordered by river or rivulet, or dotted by lake or lakelet. Journey where or how you will, by rail, or boat, or behind the fleet roadsters on any of the people's highways, keeping within the map of the State, and water is almost as constant to the view as are forests and cultivated farms. So many are the rivers and streams that debouch into Northern Lake Michigan, Lakes Superior and Huron, that many await the kind offices of some future Adam to give to them their appropriate names. So, too, not a few lakes are in the same unhappy dilemma, waiting the coming of the ambitious fish propagandist to bestow upon them his patronymic and blessing.

The water, wherever examinations have been made, is found to be good, in nearly all cases well suited to the needs and necessities of successful fish culture. So cold, and pure, and constant are many of the lakes, streams, and springs that everywhere abound, the opinion obtains that they derive their supplies by subterranean openings or passages with the great bordering lakes. Nor is this opinion wholly without foundation; certain it is, whether from this or other cause, not now important to determine, that in purity, steadiness of flow and supply, and in all those requisites and adaptations for producing a varied and valuable fin life, the waters of Michigan will contrast favorably with those of any State or section of the country. Out of over two hundred lakes examined last winter and spring with the express design to test their adaptedness to fish deposits, nearly all were reported to have deep water, free from any deleterious mineral impregnation, and from all substances of a noxious or infectious character,—supplied generally by cold springs, and sustaining already, where care and good judgment have been exercised in their protection and preservation, a large, and in some cases a good variety of edible fish. Hence, we safely conclude that Michigan, so far as the waters are concerned, may enter at once, and with strong heart, upon the work of fish propagation and fish production, with every assurance of complete success. In her multiplicity and diversity of waters, extending over seven degrees of latitude, and more than eight degrees of longitude, it is with just reason believed that all the more valuable propagating varieties of food fish, to be obtained in this country or elsewhere, will subsist and thrive.

In near association with the statement respecting the extent and value of our Michigan waters is the subject of the fish that live in them. A brief enquiry into our native fish, that is the more valuable kinds, while of general interest, is particularly within the scope and objects of this report. What, then, are some of the choicer species native to Michigan? First and foremost, in the catalogue, I place the

WHITE FISH (*Coregonus albus*).

The White Fish is undeniably the most valuable fresh water variety found on the continent. Its geographical range in the United States extends from Lake Ontario through all the great lakes to the head waters of Lake Superior, whilst a few are found in some of the inland lakes of New York and Michigan,

ınd they are reported in limited numbers in a very few of the lakes of Wis-onsin and Minnesota. For the purposes, however, of home consumption, as well as for commerce, the great chain of lakes affords the only field of supply. These lakes in former years, and even now after years of improvidence and waste, produce millions annually. Yet the catch is very appreciably diminishing, to the evident alarm of the States that border on the lakes, and of the country at large. The causes of this decrease are too transparent for enumeration or designation. The simple mention of the naked fact opens a volume replete with bitter recollections and reproof. Avarice, human greed, regard neither the times nor the modes of capture, and ignorance is their stupid associate and ally. Decay and famine even ever have followed, and ever will follow in the footsteps of such a copartnership.

The size and quantity of the fish vary in different waters. In their more northern habitat at Sault Ste Marie (the outlet of Lake Superior) they average four pounds, and in the head waters of Lake Superior they have been reported caught weighing high as fifteen pounds! while from the more southern lakes of the chain their average will not exceed two or three pounds. The quality of the fish, too, is believed to vary in different waters—those on the north shores of the lakes and in the higher latitudes being regarded superior to those in lower latitudes, owing, as it is said, to the cold spring streams that debouch in the lakes on the north side, and to the constantly colder water produced by higher latitude.

A minute description of this fish is hardly necessary, as nearly every resident of Michigan is familiar with this most excellent and popular fish. In general terms it may be stated its back is of a grayish color, the rest is beautiful white, and when emerging from the water, of most lustrous appearance. Head small as contrasted with its body, and when approaching the spawning period, the head is thought to decrease in size, imparting to the fish almost a deformed look. The spawning period is from middle to late autumn. Their natural resort is in deep water, except during the spawning season, when they take to shoal water for the deposition of their spawn. The number in certain localities and at certain seasons, being so greatly in excess of their number in the same localities at other seasons, has led some into the belief that they are of a migratory habit, the great bulk of them retiring to the upper lakes during the spring and summer, and seeking the lower lakes as the generation season arrives. This claim, however, of a migratory habit or disposition, is by no means clearly established. The White Fish is a large but careless breeder, so that in the absence of artificial appliances to rescue the ova from the hydra mouths that lie in wait for their destruction, but comparatively small results come from its prolific habit. The young are extremely active, and incline to deep water, thereby escaping the attacks of predaceous fish, and of numerous other enemies that are accustomed to glut their appetites and regale their native depravity in shoal waters.

On the subject of the food of the White Fish there exists quite a diversity of opinion. They being neither predatory nor carnivorous feeders, the better judgment seems to be that their food is of vegetable origin,—the product of aquatic plants, insects, and jelly-like crustacea. Their peculiar conformation and structural organism, their known habits, and the quality of their meat, go to substantiate this view. Nothing has ever been found in the intestines of the White Fish that would establish in any degree their relation to the predaceous carnivorous family; hence the inference, supported by observation, is to the

effect that their food is of vegetable origin, water insects, the offshoot of aquatic plants, and different forms of crustacea. The food of the young fish, too, soon after hatched, must be the infusoria of the water, that microscopic animalcula life with which every drop of water teems when brought into certain conditions, one of which conditions is the presence of aquatic plants and vegetable growth. This view accords with the teachings of instinct, for the parent fish invariably seek the shoal waters for the deposition of their spawn, where there is usually an abundance of aquatic plants and minute insect life, instinct so directing and assuring them that in such place or places will their offspring on emerging to life find the food adapted to their tender and delicate constitutions. The young White Fish carries a sac the same as other members of the Salmonidæ family, which is soon absorbed, lasting them generally from seven to ten days. This yolk sac of the White Fish, unlike that of the Trout or Salmon, from the hour they dash away the house of their birth, seems to offer no perceivable resistance to their agile movements.

The White Fish is not, in the common acceptation of the term, a game or fly fish. Not but what they may have been caught with the line and the rod, but if so caught there was a double mistake, the fish and the angler both counting, in sporting parlance, on a "scratch," for the fish did not intend to be so caught, nor did the angler make his cast in any expectation of such result. They are pure and simple a net or seine fish. And this leads me to suggest, as the present law is against all net or seine fishing, some provision, or some modification of the existing statute will have to be provided as applying to the catch of the White Fish now being introduced on such a liberal scale into the inland waters of the State, for to so introduce them, with a law confronting their catch and utilization, would be to consign the fish culturist and fisherman to a doom as pitiful as was that of Tantalus or Sysiphus.

The question of the production and almost indefinite increase of the White Fish is no longer an open one. It has passed from the realm of doubt and debate, and is become an incontrovertibly attested and recorded fact. During the last winter and spring over fifteen hundred thousand were successfully hatched and in most excellent condition planted in over two hundred of the choice lakes of Michigan, with every reasonable assurance of a growth and increase that shall lift this fish question into the consequence and dignity of a State work and enterprise. That large number were hatched under the direction and superintendence of N. W. Clark, Esq., of Clarkston, a well-known and indefatigable fish culturist of our State.

Of the methods of obtaining the White Fish ova, their fertilization, the laying them in the hatching boxes, their subsequent manipulation and treatment, will substantially appear in what is said under the general head of fish culture, since the methods of procuring spawn, the impregnation and hatching the different varieties, in their general features, are so nearly alike, that one description will suffice for all.

LAKE TROUT.

Perhaps the next fish in importance, indigenous to Michigan waters, are the Lake Trout—known under various names, Mackinaw Trout, Salmon Trout, Namaycush, Salmo Siskawitz, and even these do not exhaust the nomenclature. These several varieties, differing in size, coloring, and general appearance, are without any very great structural differences, and are undoubtedly congeneric, all being of lacustrine habitat and habits, and non-migratory, they rarely ever

tering any of the rivers for the purposes of spawning or in quest of food. he Namaycush, or Great Lake Trout, attain in some waters to great size, hile its brother, the Siskawitz, and other Lake Trout, as a general thing, are considerably less size,—size, appearance, and other conditions depending ry much on locality, depth, and temperature of water. The spawning season in Autumn, October being the fish culturist's best harvest month. As the neration period arrives, they approach the shores for the deposition of the wn, seeking out the gravelly shoals of the lake, and are not infrequently n in those narrow gravelly channels between the many islands that fringe shores of the great lakes.

The spawn of the Lake Trout may be obtained by the artificial methods, d about the same processes of incubation obtain as with the ova of other mbers of the Salmonidae class. The Lake Trout are a very acceptable and luable table fish, already supplying a large home consumption, while as an icle of commerce they rank very high. Fish dealers have informed us that y are more easily kept in good condition during the warm seasons and bear nsportation better than almost any other variety. This species, it is be- ved, may be successfully introduced into all the larger and better class of inland lakes, where they will find water of ample depth and food in suf- ent supply to warrant the experiment of their culture. I understand it is wish and purpose of the Commission to take up the Lake Trout at the liest day practicable and compatible with the work and duties in hand.

BLACK BASS (*Grystes nigricans*).

his fish is found in almost every part of the State, in the lakes and rivers, in waters greatly varying in size, depth and temperature. While ranking y high with many, both as a game and food fish, I fear with the great body our people the fish has not secured that measure of appreciation to which is justly entitled. In New England, and other States, the Black Bass is d in high esteem, and the several Commissions are devoting not a little of ir time and funds in stocking their waters with this most desirable species. d I confess I can scarcely resist the conviction, as fish culture shall grow l ripen into one of the enlarged and approved industries of the century, that reputation of this fish will so grow with its growth and strengthen with strength as to give him precedence over varieties to which he is now ught inferior. As a table fish, few are superior, the dyspeptic and the rmand alike agreeing that he is about first in their *table d'hote*, while as a ne fish he is in good repute with all sportsmen and fishermen. "Game to death," is the agreeing verdict rendered by all the sons of Walton. His ck, endurance, and a dominating kind of resolution which he plainly shows inst the right and proprieties of his capture, give him a rank among the izens of fresh water not essentially different from that of the Salmon of water.

But to the fish husbandman, private or public, this fish possesses qualities l traits of great rarity and excellence. As a hardy fish, growing in and pting himself to waters differing in depth, temperature, or other condi- ns, and as an uncostly propagator and abundant breeder, none have or rve a better reputation,—although many other species may excel the Black s in fecundity, and yet in that almost marvelous care which they bestow n their ova and young lies the secret of their wonderful increase. It is by s care that they become such liberal multipliers of their race, stocking

waters in less time and in larger numbers than many other species whose yield of ova is greatly in excess of the Black Bass. The Black Bass is a fish culturist. He knows the importance of protecting ova and fry, and so knowing, it takes a pretty powerful offensive demonstration to drive him away from his post of duty. They prepare their spawning beds with much care, often devoting many days to the work, and from the instant of the deposition of the ova the guard is established, and so with a vigilance and assiduity as essential as commendable, they keep watch and ward for days over their spawn or fry, as the case may be, vigorously attacking and driving off all intruders. This watchful interest in the welfare of their ova and offspring is shared by both representatives of the paternal and maternal line, furnishing an example of domestic duty and harmony that might be patterned by many other of the finny tribes to their certain advantage as well as credit.

It should be stated, in this connection, that the ova of Black Bass are not subjected to any of those methods of procurement or manipulation which have obtained with fish culturists in their treatment of the ova of many other varieties. Waters are stocked with this species by deposits of fish, old or young, as found most practicable to procure or to handle. And all the subsequent labor or attention required is to see that they are provided with good pastures and that the shield of the law is over them, protecting them during the spawning seasons, which in this latitude are the months of May and June.

THE GRAYLING (*Thymallus tricolor*).

Eminent fish culturists and naturalists have for some time been at work, and are still at work, to draw the Grayling forth from his long seclusion, in the hope of determining his position and value in ichthyic and aquacultural science. I think all will agree that this work is not yet satisfactorily completed. But as respects his gamyness and beauty there seems to be no dissenting opinion. All, fish culturist and amateur sportsman, learned and unlearned, come away from his haunts praising with one accord his fine pluck and great personal attractions, the standard of comparison being generally the Speckled Trout, and all know that no such comparison is at all *apropos* except upon the assumption of real and demonstrable merit. In gamyness the equal of the Brook Trout, and in form, coloring, grace, motion, the peer of all the tribes, appears to be the well settled judgment of all who have made his acquaintance. This is about the extent of their agreement. And since unanimity happily exists to that extent, whatever may be said outside the limit of such concord of views may be adjudged partial and partisan, I shall not, therefore, touch on any of those points or questions upon which there may be and doubtless is an honest difference of judgment. Thankful that so good a fish State is the possessor of so distinguished a member of the fin family, a brief general description will be in order.

The markings of this fish are peculiar and unique, being as beautiful as rare. The large first dorsal, while giving character to the whole fish, is of itself a marvel of beauty. At its lower extremity are tints and colorings not unlike the plumage of the peacock. But perhaps the more wonderful attraction of the dorsal fin lies in the fish's habit of using it. When the fish is in repose the fin droops and rests on the back, having the appearance of being folded. But when commencing to move, especially if the movement be angurar, almost instantaneously the dorsal becomes distended, the front part rigid, and the back part waving like a flag in a strong wind. At such times the fin

is very beautiful, and is altogether the most noticable thing about the fish. And from this resemblance, by no means a remote resemblance, to a flag, has come, most probably, that other name by which the fish is known, *thymallus signifer*, the flag-fish, or standard-bearer. The ventral fins, too, are strongly marked. Bars of different color and shadings run laterally, and cover the entire surface of the fins. Now add to the foregoing a delicately proportioned head, a handsome and a wonderfully expressive eye, dark brown spots or patches along the anterior sides and above the lateral line, a most symmetrical outline and figure, united with great grace and facility of motion, and you have a fish the most attractive and remarkable of the American fauna. As a beautiful and gamy species the amateur sportsman need go no farther to gratify his taste or his ambition. But as a food fish for the people,—a variety to be entered upon the catalogue of piscicultural industry, for the stocking of private or public waters, in the hope of an increased food supply, on this question there is a divided opinion,—one party inclining to the belief that in the Michigan Grayling we have the *ne plus ultra*, while another party, equally certain and zealous, think as a food-producing species but little reliance can be placed upon him.

At all events, enough is not yet known as regards times of spawning (believed to be in the spring), yield of ova, conditions of growth and reproduction, endurance, ability to undergo acclimatization, to induce any of the Fish Commissions of the several States, up to the present time, to enter upon their culture for either private or public waters. Within the last year repeated efforts have been made by eminent persons and parties to settle the Grayling question, so interviewing and "writing him up" as to know his exact piscicultural worth and promise. It is earnestly hoped that success will attend these efforts, for uncertainty in a matter of so much interest is but a tithe better than blank ignorance. The American Grayling is peculiarly a Michigan fish, our water, so far as definitely ascertained, being the sole and fortunate possessors of this greatly admired and, as many believe, the "coming" fish. I am aware that a claim is made in one or two localities outside of Michigan, but it is a vague and vagrant one, not yet entitled to a place among the "fixed facts."

Their habitat is the Au Sable, the Muskegon, Hersey, Pine, Boardman,—indeed very many of the streams and rivers of Central and Northern Michigan, possibly a majority of them, are believed to abound in the Grayling. It is said that they have been caught weighing 4½ pounds. Their average catch, as reported, is from one-half to two pounds.

I cannot conclude the notice of the Grayling without stating that there have been at the State Fishery, for the last nine months, sixteen Grayling, from nine to fourteen inches long. They have occupied one of the small spring ponds in company with several hundred Speckled Trout of about the same age and size, where at all times there have existed, as far as observation and appearance can decide, the greatest friendship and concord. They rise to the surface to take their food a trifle less sharply than the Trout, and show about an equal percentage of growth. They eat all kinds of food that are prepared for the Trout,—liver, lights, heart, kidneys, etc.

These sixteen Grayling, which have been of so much value to the Fish Commission, and contributed to the gratification of hundreds of visitors, are a donation from H. E. Sargent, of Chicago, late General Superintendent of the Michigan Central Railroad. I note this fact with the greater pleasure, since

Mr. Sargent has in many unsolicited ways and instances shown his high appreciation of those efforts which Michigan has made and is making to establish fish culture among the permanent and honored industries of our beloved State.

BROOK TROUT—(*Salmo fontanalis*).

In the list of fish indigenous to Michigan, not least in affectionate interest are the Speckled Trout,—always and everywhere a favorite with the fish breeder and true sportsman.

Until attention was called to the general subject of fish propagation, it was currently reported that the genuine *Salmo fontanalis* had no *domicilium* in the State. But later investigations verify the fact that he not only exists here, and that, too, in many portions of the State, but that he is here in all the inimitable investiture of his prime and glory. Specimens have been shown the Commission, obtained from the streams of Northern Central and Northern Michigan, equaling in every respect their New England, New York, Pennsylvania, and Rocky Mountain congeners. *Salmo fontanalis*, as its name implies, is a fish of the streams, the *fountains*. Mountainous and hill-side springs, and "babbling brooks"—pure and swift rivulets having gravelly and rocky beds, where the water in its dashing, splashing flow, of very necessity becomes in large measure oxygenized, for probably no species is a larger consumer of oxygen; these are the natural haunts of the "speckled beauties." And their culture in any other class of waters will ever most likely be attended with but indifferent success. The Brook Trout being thus particular, always preferring to "take his clear and cold"—a slow grower, an unprolific breeder, and little regarding the convenience of fish culturists as to spawning periods (the late fall and winter months), and withal being in a pre-eminent sense an amateur fish, none of the Commissions of the several States, Michigan included, have deemed it advisable to enter this species in their vocabulary of food-producing fishes. And though left thus to private or individually associated enterprise, no apprehension whatever is felt, but that his great beauty, rarity, gamyness, and par excellent platter reputation, will long keep him from being numbered with the extinct fauna.

OTHER NATIVE FISH.

Many other varieties are found scattered throughout all the waters of the State, such as the Pike and Pickerel families, those wicked Modocs of our waters, who apparently mutilate and kill their more amiable, Quaker-like neighbors upon the "total depravity" principle. Also, the White Rock and Green Bass, Perch, Sun-Fish, Cat-Fish, Bull Heads, Sturgeon, Suckers, and other genus and species too numerous, and many of them too worthless, to dwell on in this connection. These all exist in greater or less numbers in those thousand lakes, rivers, and streams, that dot and checker like the lines of a chessboard, the entire area of the State. To supplant many of these varieties, by the introduction of the better sorts of food fishes, is the aim and hope of the Commission.

Having shown I fear but imperfectly, the necessity and the advantages of fish production—the great number and value of our waters, and given a brief description of the better classes of fish indigenous to Michigan waters, the foundation is laid for another branch of the general subject.

And now what is

FISH CULTURE?

This being the first of our Michigan Reports, I deem it not only proper, but important to describe and explain in a brief and general way, the art or science by which fish-producing results are secured, and shall speak of it rather as an art than a science.

Fish culture or fish production is an industrial art, requiring labor, and practice and skill to produce sought for results. It is as distinctively an art as is glass or iron manufacture, or fruit production, or stock breeding, or farming, requiring certain appliances and adaptations to the obtainment of ends, the same in the one case as in the other. Not, perhaps, one of the "liberal" or "fine" arts, yet the century may not close ere the adjectives "liberal" and "fine," shall not inaptly qualify our rising and cherished art. It has already progressed far enough to have become the subject of innumerable patents and copyrights,—confirmation strong that it is no weakling in aspiration and promise.

Its claim is an augmented food-production and supply—by means of which a valuable article of food, almost indispensable to a proper bone and brain development, may be doubled, trebled, quadrupled, quintupled. This is fish culture in theory. In scientific practice it involves a study of the waters to know at what point reformation may begin and to what just limit it may be carried,—a study of the fishes, to know their worth, spawning seasons, peculiar habits and necessities,—an investigation of the causes of their decrease or increase, as the case may be,—a complete knowledge of one and all of those essentials that antedate birth, development, and the reproduction of valuable animal life. Then follows the manual work,—the preparation of ponds, races, hatching-houses, supply troughs, hatching boxes, egg-trays, partition-screens, egg-nippers, pans, dippers, brushes, feathers, *et cetera*. The master workman, whatever his trade or occupation, will see to it that his chest of tools is full and in order. Next comes the procurement of the breeding fish, male and female, to be obtained if possible without any bodily injury, healthy, vigorous parents always preferred. The fish obtained, the fish-culturist, guided by observation and experience, will quite readily detect in the gravid fish those signs that precede and denote the mature spawner. Carefully noticing the premonition indications, the porcelain pan or tin pan is brought to the place of operation, containing but very little if any water, the viscid fluid that accompanies the flow of the ova affording sufficient moisture. Formerly water was used, but is now generally discarded, it being thought to have the effect of drowning the spermatozoa or life principle of the milt. The spawner is then caught, gently seized and held (if small, one person is sufficient, but if very large, two or more persons are required) in an oblique perpendicular position, the vent being directly over the pan. If ripe, which means a mature condition of the ova, the eggs will often flow into the vessel by the mere force of gravity or muscular contraction, without any hand pressue or manipulation whatever; but if not so yielding up her spawn, a slight pressure with the thumb and fingers along the abdomen will cause the ova to be extruded. This process, once or twice repeated, in a majority of cases, will secure the entire yield. The fish is now returned to the water in almost as good condition as when taken from it, for the whole process has not occupied more than from twenty to forty seconds.

The male fish—or milter, as he is termed by pisciculturists—is now taken from the tub or trough near at hand, held in a similar position, and the manipulator, by a gentle pressure along the lower portion of the abdomen, will discover, provided the fish is ripe, an extrusion into the vessel containing the ova of a few drops of a creamy, whitish substance, termed milt, spermatozoa, or fertilizing fluid. The fish is returned to the water, no pain or injury having resulted. A very little water is poured into the pan or porcelain vessel, and the contents gently stirred with a feather, or tremulously shaken in a manner to give the ova a rotary motion, and very soon all or nearly all the eggs will have become impregnated, vitalized. The pan is now allowed to stand a few minutes. The eggs meanwhile are undergoing great changes. Prior to the introduction of the milt, or zoosperms, the eggs were in a manner agglutinated and in a flaccid condition. Now they have become enlarged, are more translucent; each egg, no longer coherent, is an individuality, and by one of those mysterious processes, by which Nature works, are become hard to the touch, so that they will roll about like shot on a smooth surface. Here now we have the vivified germ, the embryo fish. In this state they are taken, cleansed in one or two waters, and carefully placed upon a bed of gravel or upon wire cloth trays, and with a feather evenly distributed over the surface, the object of such spreading being to allow the clear, living water to come continually in contact with all the eggs, well oxygenized water being as essential to a normal, healthy development of the embryo as it is material to the life and growth of the fish in its subsequent stages. Now, with pure and perpetually running water, filtered if necessary by one or more flannel screens, with clean tools, clean surroundings and with clean hands, we enter upon the work of incubation, a labor lasting five, ten, twenty, forty, eighty, one hundred and twenty days or even longer, depending upon species and upon quality and temperature of water. Dead eggs, easily distinguished, whenever discovered, are to be at once removed, as they produce a byssus that sends out its clammy, fibrous arms, like Hugo's devil-fish, to destroy every living egg within their reach, and all sediment and substances of every sort foreign to the before-named conditions of their health and growth are to be sedulously guarded against. The eyes first appear, then a faint embryonic structure, and soon after a dim outline of the "coming" fish may be seen, growing more and more visible each day, until some morning you see the wreck of a habitation floating down the current, and a tiny creation, most unmistakably alive, settled down amid the interstices of the gravelly bed, or meshes of the wire tray, a third or a half or perhaps three-fourths of an inch in length. About the most perceivable thing of this new birth is a bag or sac attached to the belly of the fish. This sac with the *salmo quinnat* is of a rich pinkish color, resembling one or two drops of blood encased in a semi-transparent membraneous bag. At birth it is larger than the fish itself, rendering all movements of the new comer exceedingly awkward and clumsy. This is the umbilical vesicle, or yolk sac,—Nature's storehouse for the supply and sustenance of the fish during its tender infancy. Until this sac is absorbed the fish will eat nothing—seems to desire nothing but to be "let alone," content with the pabulum stored in its little knapsack, from which it daily, hourly draws that nourishment, the provision and pottage of birthright. Day by day the sac becomes smaller, till it can scarcely be perceived with the naked eye. Then the fish begins to move about as if in quest of something to satisfy its hunger. This yolk sac with the salmon and trout and some other species lasts from thirty to forty days; with other varieties not so long. During the existence of the umbilical vesicle the fish are known as alevins, afterwards, up to certain periods of growth, minnows or fry. The sac

being absorbed, the fry should be fed two or three times a day,—or oftener in limited quantities will do no hurt. Various kinds of food are given. Bonny clabber, the yolk of an egg boiled, calf's or beef's heart boiled hard and grated, liver of any kind except hog's liver, chopped or grated so fine as to become of the consistence of thick blood, mixed with a little sweet cream, is the practice at our State Fishery. Now, under proper care and feeding, the fish will come on rapidly, so that in a few days or weeks they are in a condition suitable to be removed from their hatching troughs and planted in those lakes and rivers, there to grow and to bear testimony that fish culture is neither a myth nor a phantasm, but an ocular, tangible and gustable reality.

Such, in general outline, is practical fish culture. The limits of this Report will not, of course, permit a statement of all the methods and processes of the art that obtain in the treatment of different species, differing as they do in different countries, and even with different establishments of our own country. They are, however, mainly differences of detail, and not of principle or essence. Nor can I enter upon a description, nor even an enumeration of the inventions, contrivances and appliances made and in use to secure what are thought to be more certain and better results, many of which have been and are used to great advantage, and to them fish culture is indebted largely for its advanced position among the arts and sciences.

From the foregoing observations respecting fish culture will follow, not inappropriately, a statement of the labor and work performed. And from such statement it will be seen that much of the labor of the Commission has been devoted to the introduction of foreign varieties, such introduction being regarded both practicable and desirable. And in this view the older fish States and the United States Fishery Commission have not only concurred, but in furtherance of such object have lent a hearty aid and co-operation.

The first work and the first money expended from the fish fund was upon the Atlantic Salmon. And hence some description of these foreign varieties, their habits and peculiar characteristics, especially the Salmon, is important to a right comprehension of the plan and work performed.

ATLANTIC SALMON (*Salmo salar*).

Salmo salar, the type of the Salmonoid family, designated *salar*, from his habit of leaping out of the water, and dashing up rapids, cascades, and even vertical falls of water seven, ten feet high, often, is a "pet institution" with the sportsman, and is in most excellent repute as a domestic and a merchant fish. No denizen of all the marine confederation can show a superior heraldry, *salmo* being recognized in Neptune's great court of the royal line.

Fish, in ichthyic science, are denominated migratory and non-migratory. The Salmon is of the migratory species, by which is meant a migration from one body or class of waters to another, for food, or spawning, or, more technically speaking, from force of constitutional law or instinct. Instinct teaches the Salmon that he cannot perpetuate his race in ocean water, nor, indeed, in brackish tidal or estuary water. The immersion of the young fish in such water is speedy death. The ancestral *line* of the Salmon runs back to the cold streams and sources of the rivers, and there must every Salmon go if ambitious to transmit his name and fame. So in the spring, or early summer, probably prompted by the procreative instinct, he heads for the homes of his ancestors, wearisomely journeying day after day, not stopping for food nor permitting any hindrances, by a line as direct as that ploughed by the keel of the steamer; he

continues until he reaches his native waters, and perhaps is not satisfied till he is within the very vicinage of his birth-home—often bruised and bleeding, completely exhausted by the long and perilous effort. There he tarries, eating little or nothing, falling away in weight and deteriorating in look and quality, until fall or early winter. Then the female commences the preparation of her spawning bed, pushing away with her nose the stones and the gravel, and smoothing with her sides and tail a small space where she may deposit her spawn, the male meanwhile complacently and with approving airs looking on to see that all is done decently and in order. Now the female to this bed or nest, when feeling the throes of egg-birth, resorts, followed by the male. Immediately, perhaps simultaneously with the extrusion of the ova by the female, there is exuded the seminal or fertilizing fluid of the male, which, coming in contact with any of the eggs, causes them to become fecundated. The eggs are then covered with the gravel and pebbles that had been removed in the preparation of the bed,—of course the covering is most imperfectly done. The parents, their procreating duty having been performed, now retire, leaving their much-to-be-pitied embryo progeny to the mercy of not merely tide and flood, but to the whole depraved horde of water thieves and robbers. How many will survive such chances the nibs of no naturalist nor fish culturist have ever made definite record; but, we venture to say, no reliable life insurance company would care to take a risk much short of a ninety-five per cent premium. The Salmon, emaciated, ungainly, still eating nothing, now commence their return to the ocean, going much in the manner they came, seeming only anxious to gain the rich feast that awaits their arrival in the great larder of the sea. Being once again in their "clover" fields, they put on sleekness and "well rounded belly," not less marvelous than aldermanic!

But, to return to the ova which were left in the bed of the stream. If deposited the first of November, and the stream be a New England or a Northern Michigan one, the *first of April* following will be an appropriate time,—early enough—to see if any *Samlets* can be found in or about the nest aforesaid. If fortunate enough to find any, they are about three-fourths of an inch long. In thirty days they will have grown to be parrs. In this parr state they continue a twelvemonth or more, during all of which time they remain in fresh water, not being provided with that armor that qualifies them for *marines*. But, after twelve or fifteen months, silvery scales, that fit their bodies as a coat of mail, appear. They now drop the parr name and take that of smolt, and in their new and very neat attire they start for a visit to their parents. During this visit of five or six months they have grown to weigh four, five or even ten pounds, and are now become maiden Salmon, or Grilse. Proud of their great growth and improved appearance, they return to their native stream, possibly to the rude, pebbly cabin of their birth, to in turn perform life's great office work, reproduction. This done, the grilse goes to the sea, and after a stay of a few months, after having passed all these physical transmutations, comes back the *adult* salmon of ten, fifteen or twenty pounds, and on this, his second return to his home waters, will, if secured by the fish culturist, reward him him with a yield of ten, fifteen or twenty thousand ova,—a growth and a result truly wonderful. Nor has he yet ceased to grow. Each successive visit to his marine meadows and return to fresh water adds to his weight and capacity of reproduction—captures being reported as high as sixty and seventy, and even eighty pounds.

Now, the question arises, can this anadromous fish, forsooth, anatomically,

physiologically formed for just such a round of duties as outlined above, whose sea-going habits seem regular and fixed as the tides or the seasons, become acclimatized and made to thrive in purely fresh waters? Fish culturists take the affirmative of this question. It is asserted that the saline quality or property of the water is by no means a need or necessity of their natures; that they go to the sea for a two-fold reason: long habit, so long and continuous as to have the force of instinct, but more especially from an intuitive kind of knowledge that in the ocean's depths and vastness are inexhaustible stores of food for them, and possibly food, too, having special adaptations to their taste and growth, and not from any organic need or necessity to be met in the saline property of the water. It is believed that, if placed in salt water as destitute of food as are those localities from which they seek to migrate, they would show the same lank and hungered look that comes of their long fasting in purely fresh water. It has been noted that after reaching, in their seaward trip, the brackish tidal waters, no material change is discoverable in look or condition, and hence it is inferable that no change of consequence occurs till they reach their feeding grounds in the sea itself.

Then, again, their spawning labor over, when moved by the impulse of hunger to cast about for food, they are unfitted, by reason of their emaciated, exhausted condition, for any considerable effort to obtain it, and so, quite naturally fall into the current, drifting with it. And with change of locality, temperature of water, and new experience, it is quite possible there may come and does come, a feeling of relief and recuperation, and, following the bent of this restorative, recuperative feeling, their course is still seaward, each day's progress probably adding strength to that sense or instinct which assures of the larger and richer pastures beyond. Thus it would seem that the question of food may be the occasion and the solution of the anadromous habit of the Salmon, and that if the food, in sufficient quality and kind, that exists for them in the ocean, could be found in the vicinity of their spawning grounds, they would show no desire to revisit the sea. So, if this migratory habit results from the ocean's supply of food, and does not come from any structural organization or function peculiar to the fish, then Salmon may be reared and made to stock fresh waters equally with saline waters, provided the fresh waters can be depended upon for a supply of suitable food. Many facts go to corroborate this view.

Salmon, without the intervention of any modern fishcraft, are found and are thriving in waters having no communication with the sea. There they are many miles inland, and there they have been from the time "whereof the memory of man runneth not to the contrary," possessing the habits and characteristics of the sea-going Salmon—eggs in color and size alike—in fecundity and manner of deposition of spawn not essentially unlike—meat, texture, and flavor scarcely distinguishable—form and anatomical structure not differing in any material point from the marine Salmon. Naturalists and fish culturists pronounce them the genuine *salmo salar*—called land-locked, because by no door or gateway do they find ingress to the sea.

Assuming this view to be correct, the inquiry arises, have we fresh waters that may be relied upon to afford a sufficiency of food, and a quality of food adapted to the production and increase of this imperial fish?

Mr. Samuel Wilmot, a fishery officer of the Dominion of Canada, and one of the earliest on this continent to engage in Salmon culture, and second to none in experiments and in general intelligence, on all points bearing upon the

Salmon question, uses the following apposite language: "An opinion prevails that the Salmon caught here (Wilmot Creek) are not the migratory Salmon of the sea, but that they are natives of Lake Ontario." Again, he says: "It is possible that the Ontario Salmon, no doubt, originally coming from salt water, may have become acclimatized." Now, if small inland lakes in New England can produce the *salmo salar*—if in Lake Ontario, so directly communicating with the gulf and the sea, the Salmon may find food and become acclimatized, so that he has no need or desire to perform those tedious journeys to old ocean, how direct and irresistible the conclusion that those our larger and grander lakes, Michigan, Superior, Huron, and Erie, afford a field for Salmon culture that cannot fail to justify and reward every hope and effort of the fish husbandman. For, if food be the desideratum, these lakes afford a supply almost as unlimited as the sea itself. Besides, the very kind of food already exists in those lakes, or some of them at least, upon which the sea Salmon largely subsists. I make this statement upon the authority of Hon. Robert B. Roosevelt, one of the New York Commissioners—a gentleman not likely to fall into error on any fish topic. I quote from a speech delivered in the House of Representatives May 13th, 1872. Speaking on the subject of an increased supply of food to meet the needs of a more enlarged fish-culture, he says: "At present, however, there is no such necessity; not only is the sea alive with food, but the large lakes are equally well peopled. It is a curious fact that in Lakes Huron and Superior is found the salt water shrimp in the deeper parts, and in quantities equal to that in the ocean. This shrimp, which itself is exceedingly prolific, is the principal food of the true Salmon, the *salmo salar*, and is supposed to constitute the red color of the flesh." So it would seem that one of the primary conditions of successful Salmon culture in our rivers and lakes is already supplied. Indeed, the subject, viewed from this or from any of the standpoints named, is full of encouragement. It is more than possible, highly probable, that all the rivers that empty into these great *unsalted* seas may, by the efforts now put forth, and by those that remain to be put forth, be made to abound with this noble fish, as did the tidal waters of New York and New England in an earlier history.

The foregoing observations upon the Salmon have seemed necessary, as there is a general distrust with our people in the success of their culture in our inland waters on the ground of their being a salt-water fish. Almost every day we hear people say, "Why do you think there is any chance for Salmon in fresh water? they are a salt-water 'craft'" (as if that were news to us), quite commonly closing their discursive queries with a significant shake of the head or a shrug of the shoulders. Well, the presentation of two or three salient facts, accompanied by a litttle sober reflection on the part of the doubters themselves, generally has the effect of modifying their unbelief, and if not becoming full-fledged converts, they are become so far interested in the new idea as to wish you a hearty God speed you. That much is taken at full value, and is of inestimable service to the Salmon toilers.

The following is a detailed statement of what has been done in stocking Michigan waters with this species.

In the spring of 1873, the U. S. Fishery Commission, through Prof. Baird, presented to the State 40,000 Salmon ova, already in a forward stage of incubation. These were hatched in the private fishery of N. W. Clark, near Clarkston, Oakland county. This was before the appointment of Fish Commissioners. On the appointment of Commissioners and the organization of the Board

May 12th, 1873, the fry were ordered distributed in the following waters of the State:

DATE.	WATER.	NO. OF FISH.
May 14, 1873	Lord's Lake, Oakland county	250
May 14, 1873	Orchard Lake, Oakland county	500
May 14, 1873	Walled Lake, Oakland county	500
May 19, 1873	Muskegon River, at Reed City	3,000
May 20, 1873	Manistee River, South Branch	3,000
May 26, 1873	Baubee Lake, Hillsdale county	500
May 26, 1873	St. Joseph River, Hillsdale county	2,500
May 26, 1873	Kalamazoo River, at Mosherville, Hillsdale county	2,000
May 27, 1873	Grand River, at Jackson	1,000
May 28, 1873	Diamond Lake, Cass county	500
May 28, 1873	Barron Lake, Cass county	500
May 28, 1873	Brandywine Creek (a tributary of the St. Joseph)	3,000
May 29, 1873	Gun Lake, Barry county	500
May 29, 1873	Whittemore Lake, Washtenaw county	500
May 30, 1873	Au Sauble River	3,000

Each of the above lots were reported deposited in good condition.

The next lot of Atlantic Salmon eggs from the establishment of C. G. Atkins, at Bucksport, in the State of Maine, was received March 10, 1874, numbering 180,000. Of this lot, 25,000 were forwarded to be hatched at the Michigan State Fishery for the State of Illinois, with instructions to plant in Calumet River; 35,000 were purchased by the Commission, and the balance, 120,000, were a donation from Hon. Spencer F. Baird, U. S. Commissioner.

These were laid in the State Hatchery at Pokagon, and were all hatched in from twenty to thirty days from the time of placing them upon the wire trays, and with a loss not to exceed two per cent. There was an after trifling loss arising from structural deformity, by far the most common malformation being a curved spine, necessitating a spiral motion whenever the fish attempts to swim.

These were planted as follows:

DATE.	WATER.	NO. OF FISH.
May 12, 1874	Calumet River, at Kensington, Illinois	10,000
May 12, 1874	Calumet River, at Wildwood, residence of Col. J. H. Bowen	8,000
May 12, 1874	Calumet River, at South Lawn, Upper Calumet	7,000
May 14, 1874	Gun Lake, Barry County, Michigan	8,000
May 14, 1874	Metcalf's Lake, Calhoun County, Michigan	1,000
May 14, 1874	Pine River (a tributary of the Manistee)	40,000
May 19, 1874	Salmon Creek (a tributary of the Boardman)	40,000

The above plantings were all made with no loss, the weather being very favorable, and meeting with no detentions in their transit.

DATE.	WATER.	NO. OF FISH.
May 29, 1874	Higgins' Lake, Roscommon County	7,000
June 2, 1874	St. Mary's River, about three miles above the Sault Ste. Marie Ship Canal, from	25,000 to 30,000

In the shipment for Lake Superior twenty-one cans were filled, believed to contain 40,000 fry, and were shipped in perfect condition by the Michigan Central to Detroit, and thence by steamboat, but owing to two days' detention of the boat, and to the very warm weather during their transit, the depositors reported a loss of from ten to fifteen thousand.

DATE.	WATER.	NO. OF FISH.
June 6, 1874	Diamond Lake, Cass County	8,000
June 17, 1874	Lime Lake, Branch County	3,000
June 18, 1874	Salmon Lake, Berrien County	5,000
June 20, 1874	In springs and streams tributary to Dowagiac Creek	2,000

And here perhaps a word of explanation is necessary. It will be noticed in the foregoing recital of Salmon planting that 25,000 of the lot hatched by Michigan were deposited in the Calumet, a river of the State of Illinois. Now this deposit was made in pursuance of an arrangement or understanding with Prof. Baird, United States Commissioner, he, in substance, saying, I make no charge against your State for the 120,000 forwarded you, but request that as you have rather liberally received you will reciprocate by passing something over to Illinois. And so in all cases where any of our work goes out of the State it is in consideration of some favor or favors conferred by the United States Commission, or by some of the State Commissions,—it being simply an exchange of benefits.

A small beginning has been made in introducing another member of the Salmon family into Michigan waters. I mean

THE LAND-LOCKED SALMON (*Salmo sebago*).

Land-locked is now the commonly recognized name of the fresh water Salmon. The term would seem to imply that the land holds this species in restraint of its natural and preferred liberty,—but this may not be so. Whether its residence in fresh water is from choice, or from some peculiar chemical or physical character of the water of the lakes in which they are found, or is the result of some overmastering force or convulsion of the sea, of which history has left no record, are points upon which the "wise men of the east" differ. All however agree that it does not go to the sea, although in some of its *habitats* no physical barriers exist to prevent its migration to the sea. In anatomical structure, markings, habits (except the migratory one), it is almost the exact counterpart of the *salmo salar*, and is believed by naturalists to be the true descendant of the sea-going Salmon. They vary greatly in size in the different lakes. Some of the smaller lakes have larger fish than the larger lakes. Sebago lake contains the largest. The average weight of the males in this lake is five pounds; females, three pounds. Catches are reported as high as seventeen and a half pounds. They are found only in the waters of Scandinavia and North America, and in but very few waters of those sections of the globe. Not a dozen of the many thousand lakes of this continent contain this species. Sebago Lake, both branches of the Schoodic Lakes, Sebec and Rasp Lakes, and two or three others, all in the State of Maine, are the only lakes in which they are found. Over a year ago an organization was formed by several of the New England States, joined by Prof. Baird, to erect ponds and a hatching house at the mouth of Ship Pond Stream, at the head of Sebec Lake, for promoting the culture of this particular species. About 50,000 spawn were obtained last winter, and of that lot Prof. Baird donated to Michigan 3,000. They were shipped about two weeks later than the Sea Salmon ova, and did not arrive in as good condition, still a large proportion of

them were hatched. On the 20th of last June they were removed from the troughs and placed in the State Fishery springs and ponds, with an opportunity to pass out into Dowagiac Creek. All, or nearly all, have availed themselves of that privilege, as scarcely none are now seen in the springs and ponds. Should this Sebec Lake enterprise prove successful, and from the high character of the parties engaged in it there can scarcely be any doubt, an opportunity will probably be afforded for obtaining larger supplies in the future.

One other important member of the tribe of King Salmo has occupied largely the attention of the Commission. I mean the

CALIFORNIA SALMON (*Salmo quinnat*).

Our State, somewhat late in espousing the fish-cultural enterprise, yet in her work upon the California Salmon, is not behind any of the older fish States. All that has been done towards introducing this fish into the waters of the State has been attended with more than an average degree of success, and the outlook for permanent beneficial results is of the most encouraging character. Barring the question of salt water, perhaps no section of the globe is so well adapted for the colonization of this species as are the streams and rivers that debouch into our great system of lakes. Here they will find ample range, ample food, and from the mouth of the St. Joseph to the mouths of the rivers that feed Lakes Superior and Huron a climate and temperature of water nearly as diversified as exist upon the coasts of California and Oregon. By reason of the variable water and climate of those coasts the Salmon is found spawning at almost every season of the year. At the U. S. Breeding Camp on the McCloud River, a tributary of the Sacramento, where all of the eggs have been obtained, they spawn in August and September, whilst in rivers on the coast they spawn in the winter months, and in the mountainous districts in the spring and early summer. These diverse spawning seasons make their catch proper in some localities nearly the year round. The Salmon should never be caught for table use during the breeding period. They are then not only not fit for use, but their consumption at such times is a reproach to even the "Heathen Chinee." Nature is the great and true teacher, and her lessons in this regard are very plain. She says, with most unmistakable voice, that those who violate her wise and beneficent laws relating to the reproduction of the creatures for man's pleasure and use, do so at the risk of a most inferior and, quite probably, a positively harmful species of diet.

The United States Commission have been to work upon the Pacific Coast Salmon for three seasons—1872, 1873, and 1874. In 1872 no results of consequence were produced; in 1873 earlier preparation was made with a satisfactory outcome; in 1874 several millions of eggs were secured, the result of larger preparation and more thorough purpose. This enterprise, from its inception, has been under the superintendence of Mr. Livingston Stone, Deputy U. S. Commissioner, a most zealous and industrious fish propagandist; but not more zealous than he is intelligent in every department of fish culture. His California success, considering the difficulties and obstacles that interposed, typify in a preëminent degree New England energy and American pluck. I most gladly adopt and incorporate into this Report, two or three extracts from a letter of his of November 18, 1873, in which he says: "The Sacramento Salmon averages in the main river about fourteen pounds in the winter, and about twenty pounds in summer. The largest caught in the Sacramento, to my knowledge, weighed fifty-nine pounds. The yield of eggs is

much less in proportion to the weight of the parent fish than with the Atlantic Salmon, and does not exceed 500 eggs to each pound weight of the parent." In the matter of obtaining the eggs, he says: "The quantity of eggs which can be obtained on the McCloud, is practically unlimited; millions can be secured as easily as thousands." Of the flesh of the Sacramento Salmon, he writes: "There is no question, however, about the Sacramento Salmon in season being a fish of very fine quality indeed, and I am wholly unable, from my own experience, which has been considerable in the consumption of both Atlantic and Pacific Salmon to say that the Atlantic Salmon are better in any respect than the winter Salmon of the Sacramento, and I do not believe that any one can affirm positively that one is better than the other."

From the eggs procured in 1873 on the McCloud, Michigan received, through the courtesy of Prof. Baird, 80,000. These arrived at Niles October 14th, and the State Hatchery not being completed, they were at once taken to the private hatchery of Jackson Crouch, six miles from Jackson, and October 15th placed in eight hatching troughs on gravel beds. In fifteen or twenty days a large percentage were hatched, the loss from malformation of the alevins being greater than from dead or unhatched eggs. They grew very rapidly, and were fed, after the absorption of the sac, some three or four weeks before planting. This lot were deposited, without any loss, as follows:

DATE.	PLACE.	NO. OF FISH.
Dec. 25, 1873	Butternut Creek, a tributary of St. Joseph, in Hillsdale County	6,000
Dec. 25, 1873	Sand Creek, a tributary of St. Joseph, in Hillsdale County	9,000
Dec. 27, 1873	Gull Lake, Kalamazoo County	3,000
Dec. 27, 1873	Lake in Ross Township, Kalamazoo County, two miles in circumference, free from predaceous fish	200
Dec. 25, 1873	State Hatchery Ponds	700
Dec. 29, 1873	East Branch Kalamazoo River, Jackson County	15,000
Dec. 30, 1873	Grand River, Jackson County	12,000
Jan. 1, 1874	Sand Stone Creek, tributary of Grand River	12,000
Jan. 2 and 3, 1874	Sand Stone Creek, tributary of Grand River	12,000
Jan. 2 and 3, 1874	Perkins & Hess, for experimental purposes in their artificial ponds at Grand Rapids	200
Jan. 6, 1874	Crouch Creek, tributary of Grand River	4,000
Jan. 6, 1874	Jackson Crouch retained at his Fishery some	2,000
May 8, 1874	Pond at Lunatic Asylum, Kalamazoo	130

The 700 at State Hatchery have been very healthy, only seven deaths during nearly a whole year. They have been generally fed once a day. They eat with much gusto liver, kidneys, hearts, lights and other meats, and keep the surface of the ponds where confined free from all bugs and insects of every kind. The water is in a ferment of agitation during the feeding, they often jumping clean out of the water to obtain the food before it touches the surface. The average length and weight Dec. 1, 1874, was: length, seven inches; weight, one quarter of a pound; girth, three and a half inches. They appear quite domesticated, will take food almost from your hand, and at your very feet. The numerous visitors at the State Fishery, without exception, have pronounced them very handsome and interesting fish, and have expressed the

most ardent hopes for their successful introduction and multiplication in the waters of the State. I give an incident as illustrating their ability to take good care of number one. When about five months old a half dozen were caught, and put into a small pond containing two hundred three-year-old speckled Trout and sixteen Grayling. For a while the Trout and Grayling seemed to look upon them as lawful game, and caused the youthful Californians to make some sharp and nicely cut angles to keep out of the cannibal jaws ever open for a dainty morsel. None, however, were caught, and soon the trout gave over the chase, by their actions seeming to say to their unoffending new neighbors, "Let us have peace." Thenceforward quiet and good neighborhood have prevailed through this little water principality.

CALIFORNIA SALMON EGGS OF 1874.

October 3d 300,000 *salmo quinnat* ova arrived at the State Hatchery, and October 13th a further shipment of 300,000 were received, all in fair condition. October 15th another lot of 150,000 came, but in very bad condition;—of the last lot but few were saved. All the good eggs were immediately placed upon the trays, and a very large percentage were hatched, and are now (December 1) a very healthy and promising lot of fish.

The Commission have also given some attention to the introduction of one other foreign variety, namely:

THE SHAD (*Alosa praestabilis*).

Perhaps no fish of the American genera or sub-genera is of so great historical interest, and none, it is quite certain, has been of equal value in meeting the needs of a people who had emigrated to a wilderness home. In forefathers' history it became and was all that its name implies, "the preëminent Shad." During all the colonial history, and for many years after the colony was merged into the State, Shad were so abundant that the possibility of a scarcity at any future period never occurred to the people of those early days. Indeed, in indentures between master and apprentice, at the instance of the latter, it was no very uncommon thing to have a clause inserted, that the party of the first part should not serve Shad at his table oftener than a certain specified number of days in the week! An apprentice that should nowadays ask for the insertion of such a clause would be deemed a fit subject for one of the charitable institutions of the State. But desolation and ruin have followed upon those years of plenty much sooner than any imagined. And seeing this, whole communities and States have taken the alarm, and girded themselves to the necessity of doing something to arrest and to repair the waste. Their efforts have already been crowned with a degree of success far exceeding their most sanguine expectations. Within the last few years many millions of eggs have been procured and hatched, and the young Shad turned into the rivers, so that now not a few of the waters begin to teem with something of the abundance of former times. To reinstate the Shad and thoroughly restock those rivers which have become so nearly depopulated, is beyond all question practicable, and is, of course, an undertaking of great value and interest to all the Atlantic States, the expense and labor being but slight compared with the reasonably looked for rich returns. But for interior States, located hundreds of miles from the sea, the colonization of Shad into their waters is by no means so hopeful of beneficial results. Under the most favorable circumstances any considerable measure of success must be regarded as altogether problematical.

The Shad is, in its *habitat* and habits, much more a marine fish than the

Salmon. It spends more time in the salt water; it does not go so high up to the sources of streams and rivers for spawning, very frequently spawning in estuary or brackish tidal water; the fry are not injured by salt water; indeed their early fin efforts are seaward. None are found, as is the case with the Salmon, in the inland lakes. Besides, admitting the possibility of successful colonization for States already supplied with White Fish, Salmon, Trout, Black Bass, and other choice varieties, the need of such importation is not very manifest.

The Michigan Commission, however, sharing the zeal and faith of the Atlantic fish States, and with their recommendation and coöperation, has very fairly made the experiment of their culture,—results not yet known.

The following is a summary of their work with the Shad:

DATE OF DEPOSIT.	WHERE MADE.	NO. OF FISH.
June 17, 1873	Grand River at Lansing	50,000
June 24, 1873	Detroit River near Detroit	20,000
June 24, 1873	Grand River at Ionia	80,000
June 28, 1873	Flint River at ———	10,000
June 28, 1873	Raisin River below Monroe	10,000
June 28, 1873	St. Joseph River at Niles	30,000
June 28, 1873	Long Lake, Kalamazoo County	10,000

About one half of the fry were obtained at Camp Green, on the Hudson, some twelve miles below Albany, and the remainder at South Hadley Falls, Massachusetts.

During the summer of 1874 there were planted by the U. S. Commission, without cost or charge of any kind to the Michigan Fish Commission, the following lots:

June, 1874	Shiawassee River near Corunna	80,000
June, 1874	St. Joseph River near Elkhart, Indiana	50,000
July 31, 1874	Detroit River opposite city of Detroit	75,000

Thus it is seen that ample work has been already done to test the practicability of Shad culture in Michigan waters. If time shall prove it to be a successful venture, thousands upon thousands can be added at a comparative trifling expense.

The foregoing embraces all that has been done upon foreign fishes. And yet there is one other variety with which nothing has been done, and concerning which I must not forbear mention. I refer to the

EEL (*Anguilla communis*).

Eels, in their different species, are natives of both fresh and salt water. Those living in fresh water belong to the genus *anguilla*, and are found in many parts of the United States. The salt-water Eel spawns in salt or brackish water and migrates to fresh water, the very reverse of Shad and Salmon. They are a bottom fish, and belong to the class of gleaners. Their presence, therefore, in any body of water cannot in any perceivable degree diminish the food supply for other classes of fish. They are esteemed, notwithstanding their reptilian form, a very great luxury, and, when in good condition, are preferred by many to even the Trout. Their cultivation is easy and remunerative. Italy and Germany, and some other countries, derive no inconsiderable revenue from their culture. Thousands upon thousands of little Eels, not much larger than No. 10 cambric needles, can be obtained in the spring of the year at an

pense but little in excess of the cost of transportation, and there are numerous waters scattered all through the State unquestionably well suited to their ture.

Aside from the intrinsic value of this species, perhaps no variety more universally meets the popular wish and expectation. All over the State are residents who came from those sections of the country where the Eel was a birthright institution, "to the manor born," and who will hail with peculiar satisfaction their introduction into Michigan waters. Indeed, on scarcely any one fish subject has an expression of the popular wish been more general or demonstrative. A gratification of this desire, if compatible with the general work, will not only promote an important branch of fish production, but may have the effect to inspire a larger zeal, and possibly be the occasion of enrolling new recruits in the fish cause.

WHITE FISH.

During the winter of 1873–4 there was hatched at Clarkston, Oakland County, under the auspices of the Fish Commission, N. W. Clark, Esq., superintending, upwards of a million and a half of White Fish. The eggs were laid the latter part of November, 1873, and commenced hatching the latter part February. The hatching operations at Clarkston last winter were eminently successful, and have established, beyond all cavil or doubt, the absolute feasibility of multiplying, to any desired limit, the White Fish, the acknowledged queen of the Lakes.

From the large product of the winter's work deposits were made in over two hundred lakes. The planting was done by volunteers, who, in every instance save two, met the cans of fish at the stations designated, on the arrival of the train. Printed instructions having been furnished the depositors, they took exclusive control of the planting of the fish, and, judging from the returns reported to the office of the Secretary of the Commission, too much credit cannot be given to the energy and discretion with which the volunteer corps discharged their important trust.

The subjoined exhibit shows the lakes supplied, the County in which they are situated, the date of deposit, and the number of fish:

Name of Lake.	Date of Deposit.	No. of Fish.
Allegan.		
Base Line	April 15, 1874	5,000
Green	April 9, 1874	5,000
McDermott's	April 9, 1874	5,000
Osterhaus & Clear	April 15, 1873	6,000
Pine	April 9, 1874	10,000
Barry.		
Bascom	March 30, 1874	3,000
Cedar	March 30, 1874	5,000
Crooked	April 9, 1874	5,000
Gun	April 9, 1874	25,000
Wall	April 9, 1874	5,000
Wintergreen	March 30, 1874	5,000
Berrien.		
Big Paw Paw	April 15, 1874	25,000
Clear	April 2, 1874	5,000
Little Paw Paw	April 15, 1874	10,000
Pike	April 2, 1874	5,000
Reddings	April 2, 1874	5,000
Salmon	April 2, 1874	5,000
Branch.		
Mattison	April 7, 1874	5,000
North	April 7, 1874	5,000
Quaker	April 21, 1874	3,000
Vincent	April 7, 1874	5,000
Calhoun.		
Church	March 30, 1874	3,000
Duck	March 30, 1874	10,000
Goguac	March 30, 1874	10,000
Homer	April 7, 1874	5,000
Lyon	April 7, 1874	3,000
Maynard	April 7, 1874	3,000
Shedd	April 7, 1874	5,000
Town Line	March 30, 1874	3,000
Warner's	April 7, 1874	3,000

Name of Lake.	Date of Deposit.	No. of Fish.
Cass.		
Barron	April 2, 1874	5,000
Bunker	April 2, 1874	5,000
Christian	April 15, 1874	2,500
Corey	April 7, 1874	10,000
Davis	April 15, 1874	3,000
Diamond	April 7, 1874	10,000
Eagle	April 15, 1874	2,500
Indian	April 2, 1874	5,000
Mud	April 15, 1874	3,000
Twin	April 2, 1874	5,000
Clinton.		
Blood's	April 21, 1874	3,000
Eaton.		
Narrow	April 21, 1874	10,000
Pine	April 10, 1874	10,000
Genesee.		
Long	March 24, 1874	25,000
Pine	March 24, 1874	10,000
Sackner	April 7, 1874	10,000
Hillsdale.		
Bird	April 13, 1884	5,000
Crystal	April 15, 1874	3,000
Goose	April 15, 1874	5,000
Grand River	April 15, 1874	3,000
Half Moon	April 13, 1874	3,000
Lime	April 10, 1894	5,000
Long	April 15, 1874	5,000
Long	April 15, 1874	5,000
Moon	April 15, 1874	3,000
Perch	April 15, 1874	3,000
Ingham.		
Pine	April 10, 1874	10,000
Ionia.		
Morrison	April 15, 1874	10,000
Woodward	April 10, 1874	5,000
Jackson.		
Bessy	April 15, 1874	3,000
Brown's	March 30, 1874	5,000
Chatfield's	March 30, 1874	5,000
Clark's	April 15, 1874	5,000
Conc'd Mill Pond	April 7, 1874	3,000
Crispell	March 30, 1874	3,000
Farewell	April 21, 1874	3,000
Gillett	April 2, 1874	3,000
Montague	April 21, 1874	3,000
Pleasant	March 30, 1874	3,000
Portage	April 2, 1874	5,000
Reed	April 7, 1874	3,000
Round	March 30, 1874	5,000
Sandstone	April 7, 1874	5,000
Stony	April 13, 1874	5,000
Swalms	April 7, 1874	5,000
Sweezy	April 15, 1874	5,000
Tamarack	April 15, 1874	3,000
White	March 30, 1874	3,000
Whitman's	April 21, 1874	5,000
Kalamazoo.		
Bodfish	March 30, 1874	5,000
Bohas	April 2, 1874	3,000
Campbell	April 2, 1874	5,000
Gourdneck	April 9, 1874	5,000
Gull	March 30, 1874	20,000
Long	April 9, 1874	5,000
Lyons	April 2, 1874	5,000
Portage	April 9, 1874	5,000
West	April 9, 1874	5,000
Kent.		
Camp	April 15, 1874	5,000
Brown's	April 9, 1874	3,000
Church	April 9, 1874	3,000
Lincoln	April 10, 1874	5,300
Pickerel	April 9, 1874	3,000
Reed's	April 9, 1874	10,000
Silver	April 9, 1874	5,000
Soft Water	April 9, 1874	3,000
Stevenson	April 15, 1874	5,000
Lapeer.		
Big Fish	April 7, 1874	5,000
North	April 7, 1874	10,000
Lenawee.		
Deep	April 15, 1874	3,000
Devil's	April 13, 1874	10,000
Dewey	April 15, 1874	5,000
Round	April 15, 1874	5,000
Livingston.		
Bidwell	April 10, 1874	3,000
Bropha	April 14, 1874	3,000
Buck	April 10, 1874	3,000
Coon	March 30, 1874	5,000
Crooked	March 30, 1874	5,000
Fonda	April 10, 1874	5,000
Indian	April 15, 1874	3,000
Island	April 10, 1874	5,000
Joslin	March 30, 1874	3,000
Lime	April 13, 1874	3,000
Long	April 10, 1874	5,000
Long	April 10, 1874	5,000
Pleasant	April 10, 1874	5,000
Ryan	April 15, 1874	3,000
School	April 10, 1874	5,000
Silver	April 10, 1874	5,000
Sweet	April 10, 1874	3,000
Whalen	April 14, 1874	5,000
Williams	March 30, 1874	5,000
Macomb.		
Cusick	April 21, 1874	5,000
Grays	April 21, 1874	3,000
Mecosta.		
Clear	April 10, 1874	5,000
Montcalm.		
Baldwin	April 10, 1874	5,000
Clear	April 9, 1874	5,000
Conn	April 10, 1874	2,500

Name of Lake.	Date of Deposit.	No. of Fish.
Fatal	April 10, 1874	2,500
Horseshoe	April 10, 1874	5,000
Pickerel	April 10, 1874	3,000
Pine	April 10, 1874	3,000
Muskegon.		
Half Moon	April 15, 1874	5,000
Obhal	April 15, 1884	3,000
Newaygo.		
Brooks	April 15, 1874	10,000
Hess	April 15, 1874	5,000
Kimball	April 15, 1874	5,000
Pickerel	April 15, 1874	5,000
Oakland.		
Buckhorn	April 7, 1874	3,000
Coley	April 2, 1874	3,000
Cooley	April 9, 1874	3,000
Cranberry	April 9, 1874	3,000
Fleming	April 7, 1874	3,000
Gilbert	March 27, 1874	3,000
Island	March 27, 1874	3,000
Little	March 28, 1874	3,000
Long	March 27, 1874	3,000
Long	April 7, 1874	3,000
Lonong	March 27, 1874	3,000
Lord's	March 23, 1874	20,000
Narvin	April 13, 1874	3,000
Orchard	April 27, 1874	15,000
Oxbow	April 4, 1874	5,000
Park	March 30, 1874	5,000
Pettibone	April 14, 1874	3,000
Pine	March 27, 1874	15,000
Pleasant	April 3, 1874	3,000
Schoos	April 7, 1874	3,000
Scotts	April 9, 1874	5,000
Sears	April 14, 1874	3,000
Simonson	April 7, 1874	3,000
Spring	April 14, 1874	3,000
Square	April 27, 1874	3,000
Ten Lakes	April 7, 1874	3,000
Walnut	March 27, 1874	3,000
Walled	April 14, 1874	15,000
Walter	February 20, 1874	6,000
Watkins	April 9, 1874	3,000
White	April 9, 1874	5,000
Whitfield	April 7, 1874	3,000
Wing	March 27, 1874	3,000
Osceola.		
Silver	April 14, 1874	10,000
Otsego.		
Otsego	April 7, 1874	20,000
St. Joseph.		
Benedick	April 7, 1874	3,000
Eberhard's	April 13, 1874	3,000
Fish	April 7, 1874	5,000
Fisher's	April 7, 1874	5,000
Klinger's	April 13, 1874	5,000
Long	April 7, 1874	5,000
Matteson	April 7, 1874	5,000
Palmer	April 7, 1874	5,000
Portage	April 15, 1874	3,000
Sweet	April 7, 1874	5,000
Williams	April 13, 1874	5,000
Van Buren.		
Bankson	April 2, 1874	2,500
Cedar	April 2, 1874	2,500
Four-Mile	April 2, 1874	2,000
George	April 2, 1874	2,500
Gravel	April 2, 1874	3,000
Lake of the Woods	April 2, 1874	5,000
Muskrat	April 15, 1874	5,000
Prospect	April 2, 1874	2,500
Saddle	April 15, 1874	5,000
Upham	April 15, 1874	3,000
Washtenaw.		
Cavendar	April 2, 1874	2,500
Clear	April 2, 1874	2,500
Crooked	April 10, 1874	5,000
North	March 30, 1874	10,000
Raisin	April 15, 1974	5,000
Wayne.		
Yerkes	April 14, 1874	5,000
Wexford.		
Big Clam	April 9, 1874	15,000
Little Clam	April 9, 1874	5,000
Detroit River	April 14, 1874	150,000
Lake Erie, at Monroe	April 16, 1874	150,000
Lake Michigan, Grand Haven	April 21, 1874	150,000

The above deposits aggregate one million five hundred and thirty-two thousand, and cover the first season's operations in the hatching and planting of White Fish.

Arrangements have been made and the work well advanced for hatching and distributing between two and three millions for the current year. Of course, any details of the second year's work cannot be given in the present Report, but will be accurately noted and embodied in the next report of the Commission.

STATE HATCHERY SPRINGS AND PONDS.

After a somewhat extensive enquiry and examination of the springs and localities at different points in the State, with a view to the location of the State Hatchery, the preponderance of advantages were thought to be in favor of its location at Crystal Springs, situate upon the Camp Meeting grounds of the Methodist Association of the Niles District, in the Town of Pokagon, Cass County, about two miles from Pokagon Station, on the Michigan Central Railroad, and six miles from the Niles Depot.

This location summarized advantages equaling, if not exceeding, every other locality examined. The springs, seven in number, all within an area of twenty or twenty-five feet, boil up sharply from the head of a cañon, with bold banks above, and on either side, terminating at Dowagiac Creek, a distance of some five hundred feet. The fall from the Springs to the Creek is some nine or ten feet. The Springs are so situated they can never be affected by floods arising from snow-melting freshets or heavy showers. The water is very pure, entirely free from any injurious mineral impregnation,—temperature 47° Fahrenheit,—estimated flow of water three hundred gallons per minute, with no perceptible variation in the flow between the dry and wet seasons, the yield being very uniform throughout the year.

These and cognate favorable facts appearing, the Board, at a called session, September 25th, 1873, to consider specially the subject, passed unanimously the following resolution:

Resolved, That the Superintendent be authorized and empowered to erect suitable ponds and a hatching house upon the grounds of the Methodist Camp Meeting Association, near Pokagon, Cass county, provided he can obtain a lease of the springs and surrounding grounds from said Association without cost or charge to the Commission, and further provided, that the cost of the ponds and hatching house do not exceed the sum of twelve hundred dollars,—said hatching house to be not less than 20x40, and its capacity to be at least for one million of eggs."

Without any unnecessary delay a lease of the Springs, and of so much of the premises contiguous as may be necessary to operate successfully a State Fishery, was obtained for the term of twenty-one years,—the use of the Springs and the occupancy of the grounds to be free from rent and from all costs and charges of every kind and nature during the entire term. The lease bears date October 1st, 1873, and is recorded in the office of Register of Deeds, Cass County.

On the procuring of the lease, work was immediately commenced in clearing the cañon of stumps, logs, and rubbish, the accumulation of many years, an Augean-like work, and in mapping and laying the foundations of the ponds. Two spring ponds were built, each about fifteen feet in diameter, averaging a depth of water of from three to four feet,—the water from each spring pond freely communicating with the raceway to the Hatching-house. At a distance of some 250 feet below the spring dams, there has been erected another pond having an area of more than half an acre—with an average depth of water of five to six feet. Two objects were sought in the construction of this pond,—one as affording an excellent opportunity for the building of fish preserves, to be used in connection with the Hatchery, nine of which preserves are already built, and more can be easily added, if needed. The other object was to obtain such a body and surface of water as to allow during the winter months the

formation of ice, and so enable the fish-breeder to modify the water used to any scale from 48° to freezing point, using the water at such a point or degree of temperature as may be adjudged most advantageous for either the processes of incubation or for the health of the alevins. By this plan it is believed that every species of fish ova, including the White Fish, which requires the coldest water of any variety, may be successfully hatched, for it will be seen that the water can be used if desired at either 48°, or at very near freezing point, or it can be mixed in any proportions so as to bring it to any intermediate temperature between the two extremes of 48° and zero. To render more certain the formation of ice on the large pond, a raceway is constructed, conducting the surplus spring water entirely over the pond into the gulch below.

The spring ponds and the lower pond are all constructed with gates and raceways for drawing down the ponds for repairs or for any other purpose. It should be further stated that all the ponds are faced with good plank, sharpened and driven into the blue clay and battened, preventing the possibility of muskrats or other burrowing animals from breaking through. The entire work of the ponds, including the before-mentioned fish preserves, has been completed in the most thorough and substantial manner.

STATE HATCHING HOUSE.

Immediately below the lower dam, upon the right margin of the cañon, is the Hatching-house, twenty feet wide and sixty feet long, one story high, with a roomy attic used for the storing of fish-cans, fish-hatching apparatus and utensils. The building rests upon twenty large white oak posts or timbers bedded in the blue clay. The frame, sheeting, and siding are of good pine lumber, floor planed and matched, roof of pine shingle. Interiorly the whole room is faced with planed and matched lumber, and the wall thoroughly filled and packed with saw-dust, rendering it cool in summer and warm in winter. The building is painted inside and out in a very neat style, with two good coats of paint, the whole presenting a very cleanly and comely appearance.

The interior construction and arrangement is as follows: The water from the springs is brought to the hatchery in four-inch bore pump logs, iron banded and coated with cement. These pump logs run along the whole length of the building. Immediately beneath the pump-logs is a large supply trough which is kept full with water from the springs or with water from the lower pond, or from both. The pump-logs are tapped with iron spigots or gates of one and one-fourth inch inch diameter, at such intervals as needed, and the large supply trough or race is tapped with like gates, allowing the hatching troughs, which stand in pairs at right angles with both the pump-logs, and the supply race, to be fed with water from either the pump-log or from the supply race, or from both at the same time, in any quantity or proportion desired. There are eighteen hatching races sixteen feet long, one foot wide, and eight inches deep, divided into compartments of eighteen inches. These compartments are for the wire-cloth trays upon which the ova are laid. Each compartment may contain two, or three, or four, or even five thicknesses of trays, just as the necessities of the business in hand may demand. In hatching the 180,000 Salmon last spring only one set of trays were used. In laying down the 750,000 California Salmon ova last fall, two were used. The hatching races are all supplied with light and good fitting covers, hung with iron hinges. Each cover lifts to the centre, and so is never in the slightest degree in the way of a free manipulation of the ova or fry. By means of these covers, light may be almost

totally excluded, or may be admitted in any quantity deemed desirable. This arrangement for regulating light is far superior to window blinds and curtains, used in many fish-breeding establishments. Covers, in addition to their value for regulating light, are a great protection to the eggs and fry, against four-footed enemies, unavoidable mishaps and overweening curiosity. The pairs of hatching troughs have wide passage ways, allowing persons to examine and work upon the ova and fry with perfect facility, and each trough is elevated some twenty inches from the floor, permitting the operator to comfortably sit while performing his task. At the farther end of the building ten feet have been partitioned off, where are placed the stove, the table, desk, etc., a provisional sort of room, combining the utilities of office and general workshop. Notwithstanding such appropriation (an indispensable appropriation) of one-sixth of the building, the capacity of the Hatchery, as now arranged and used is, upon a modest calculation, one million of Salmon or five millions White Fish. And should the work be found growing on our hands, this ten feet might very easily be annexed to the main room for hatching uses, thus increasing its present capacity one-sixth, and in such event a small addition ten or twelve feet square to the main building could be built at a trifling expense, for office and workshop purposes.

OVERSEER'S HOUSE.

Some twenty or twenty-five feet to the right of the Hatchery, and in a line parallel with it, is the Overseer's house, 18x22, two stories, with a spacious attic affording comfortable lodgings for the smaller members of the Overseer's family. The lower story is divided into a good cellar room, pantry, and kitchen, used also for a dining-room; the upper story contains a small sitting-room and two bed-rooms, the whole supplying ample room and accommodations for a family of five or six; the present Overseer's family (Mr. Charles Michael) numbers five.

The location of the Overseer's house is most admirably chosen, as it takes in a perfect view of the entrances to the grounds, also of the springs, ponds, and hatchery, bringing the entire fishery improvements and work immediately under the eye of the Overseer and his family. A tenement separate and apart from the hatchery for the Overseer's family is greatly to be preferred to the use of the upper story or any part of the fishery building. Better order, more perfect system, greater security and cleanliness will prevail throughout the entire hatchery by their being disconnected. And if cleanliness in a theologic view is godliness, *order* and *cleanliness* in every fish "word and work" is, in a not less emphatic sense not only godliness, but are also the irrevocable conditions of the "final preservance" of all fish saints.

The Keeper's house is neatly, comfortably, and not expensively built,—is tastefully painted, and generally is in good keeping with the adjoining improvements.

In a general view; the Springs,—their non-liability to be affected by freshets or heavy rain-falls,—the quantity and quality of water,—the grounds,—their proximity to Dowagiac Creek, one of the choicest streams of the State,—and the fortunate waterfall of nine or ten feet, all combine to render it, according to the judgment of experienced fish culturists who have visited the fishery, a very superior location for the uses and purposes for which it has been selected. In addition to these great natural advantages and utilitarian considerations, the place itself is one of exceptional beauty

and loveliness. No true disciple of Walton, no genuine sportsman, no lover of babbling brooks or primeval forests, can visit the spot without a sense and glow of admiration at the wonderful and lavish beauty with which all-bountiful Nature has outlined and garnished this most charming of rural retreats.

INSURANCE.

Policies of insurance on both the Hatchery and dwelling house, for a term of three years, have been issued by the Agricultural Insurance Company of Watertown, N. Y.

Amount on Hatchery	$600 00
Amount on screens, cans, furniture, and hatching equipments generally	400 00
Amount on Overseer's house	400 00
Premiums on both risks for full term	11 38

Policies expire Dec. 15, 1876.

OFFICE AND LIBRARY.

At one of the early sessions of the Board the sum of one hundred dollars was voted to be expended in fitting up an office at the home of the Secretary. Under cover of that appropriation a room twelve by twenty feet was partitioned off, doors with good locks provided, desks and tables supplied, a large bookcase with shelves and drawers and other needed furniture procured. The security of the papers and records of the Commission, as well as the conveniences of the Secretaryship, have been greatly promoted in the fitting up and use of the office. And, although the sum voted did not meet the full expense incurred, yet the Fish Bureau have now one of the most compact and best arranged little offices that can be found anywhere in the State. In virtue of the aforesaid appropriation no charge has ever been made by the Secretary and Superintendent for rent, fuel and lights.

LIBRARY.

The members of the Commission, entering upon their duties with but a comparatively limited practical acquaintance of the subject of fish culture, deemed it advisable to avail themselves as far as possible of the knowledge and experience of the older fish States, and of fish culturists of admitted eminent rank and authority. To this end the Secretary was instructed to solicit of the several Fish Commissions their Reports, and to purchase such maps, charts, books, documents and papers as might be thought important for the Board. For this purpose the sum of Thirty dollars was voted. And now we have not only the various Annual Reports of the fish States, pamphlets, magazines and papers, but have also valuable maps and charts and several fish books of standard value and authority, together forming, as is hoped, a nucleus of a choice library. The collection so obtained are numbered and labeled with printed labels, and are kept in the office of the Secretary and Superintendent.

To this small beginning there have been added during the year, by donation, the following:

By the State of Michigan,—Two volumes "Compiled Laws;" one complete set "Session Laws;" one large volume "Statistics of Michigan;" two volumes "Geological Survey of Michigan," accompanied by a very valuable "Atlas of Maps."

By State Agricultural Society of Michigan,—Bound Reports for 1870–1–2.

By Michigan Pomological Society,—Bound Reports for 1871–2.

By S. S. Cobb, Esq., Kalamazoo,—"First Annual Report of the Commissioner of Railroads of State of Michigan."

By Gov. John J. Bagley,—"Proceedings at the laying of the Corner Stone of the new Capitol."

By J. E. Scripps and R. L. Polk, Detroit,—"Michigan State Gazetteer and Business Directory for 1873,"—a work of great practical value to the Commission.

By N. D. Lapham, Detroit,—"Articles of Association and By-laws of the Lake St. Clair Fishing and Shooting Club."

By Capt. Henry A. Ford, Niles,—One large volume, entitled, "The Great Industries of the United States."

By Silas Farmer & Co., Detroit,—"Sectional and Official Maps of the State of Michigan, 1873."

By Col. David Bacon, Niles,—"Geil's Township and Sectional Map of Michigan, 1865,"—a large and valuable map; also, a large map of the "Counties of Cass, Van Buren and Berrien, 1869."

By Hon. Spencer F. Baird,—One large volume, "Report of the U. S. Fish Commission on Sea Fisheries, South Coast of New England, 1871–2."

FISHWAYS.

There are two or three additional matters having such a direct and important bearing upon the general fish question, that a brief consideration of them cannot properly be omitted. The subject of fishways has in several cases been brought to the notice of the Commission.

In the older fish States fishways, or fish-ladders, as they are often styled, have engaged for several years the attention of fish culturists, involving in their discussion and adjudication a large expenditure of time and money. But before the popular awakening to the growing interests of the sea coast as well as our inland fisheries, the opposition to their construction is gracefully yielding, so that not a few of the old-time defendant litigants are now themselves fish propagandists, par excellent. The law governing this question has become so well settled by eminent judges and courts of last resort, it would seem that no honest opposition can ever again arise, as respects the construction of fishways, when and where needed.

A moment's consideration of the subject must render the reasons of the law and the propriety and justice of the decisions obvious to all. Every fair-minded person cannot fail to see that a dam, or any obstruction that prevents anadromous fish from going in their seasons to such parts and sources of streams and rivers as instinct prompts for the laying of their spawn, is an abatement if not an actual destruction of the fishing interests above such obstruction, and not only are the riparian owners and inhabitants above the dams injured in the enjoyment of their legal rights and privileges, but the riparian proprietors and people below the dam have their fishing rights and interests affected as well. For it is become a clearly established principle that fish of a migratory habit, when defeated in their attempts to follow out in the deposition of their spawn the leadings of their instinct, become careless and wasteful in the work of reproduction, and, so foiled and discouraged, seek other waters where no bar interposes to the accomplishment of their preordained task. And so streams and rivers, in consequence of one insurmountable obstruction, are very likely

to become barren and unfruitful altogether, below as well as above the point of obstruction.

The *dicta* of the Supreme Court of the United States on the subject of dams and obstructions in streams and rivers, in the celebrated case of the Holyoke Water Power Company *vs.* Lyman and others, are so brief and clear in statement that I must not forego their use. The Court says: "Persons owning the whole of the soil constituting the bed and banks of the stream are entitled to the whole use and profits of the water opposite their land, whether the water is used as a power to operate mills and machinery, or as a fishery, subject to the implied condition that they shall so use their own right as not to injure the concomitant right of another riparian owner, and to such regulations as the Legislature of the State shall prescribe." * * * * * * * * And again: "Ownership of the banks and bed of a stream gives to the proprietor the exclusive right of fishery opposite his land, as well as the right to use the water to operate the mills; but neither the one nor the other, nor both combined, confer any right to erect obstructions on the river to prevent the free passage of fish up and down the river at their accustomed seasons, as such obstructions would impair and ultimately destroy all such rights owned by other proprietors both above and below the obstructions on the stream."

The Supreme Court of Massachusetts also uses this language: "All persons who may build a dam for mill purposes in a stream annually frequented by fish, do it under an implied obligation to keep sufficient sluices and fishways for the passage of fish at proper seasons."

And to show that our people are not single or exceptional in their laws and adjudications on this subject. Prussia, a nation preëminently distinguished for its intelligence and sobriety of judgment, is even in advance of us on fish passes. Her law is so brief and explicit, and so fortifies the American view of the question, that it may very properly be referred to in this connection. Here it is: "We, William, by the grace of God, King of Prussia, etc., with the consent of both Houses of Parliament, order as follows: Any one who, after the promulgation of this law, places weirs, sluices, dams, or other obstructions in water where the passage of fish was hitherto unobstructed, is obliged to keep open at his own expense *passes* for the fish, and keep them in good repair." Also: "All fishing in fish passes, either with nets or hooks, or any other apparatus, is strictly prohibited. As long as the pass remains open all fishing is strictly prohibited for some distance above and below the pass, the extent of the distance to be determined by the local authorities."

So from high authorities, home and foreign, it will be seen that the principle requiring the erection of fish passes over the dams of streams and rivers, is as authoritatively and conclusively determined as the right of ingress and egress to and from our dooryards and cottages. And all who build mill, or factory or other dam, must do it in the light of the law thus glaring with reason and bristling with its sanctions.

Free rivers for fish, allowing them the most perfect freedom to obey Nature's gracious law in their increase and multiplication,—the absolute equality and interdependent right of all, whether living up stream or down stream, to share in the benefits that will certainly ensue from the unrestrained occupancy of the rivers by the finny tribes, are and must remain cardinal maxims in the republic of fish-farming.

The subject of fish passes derives additional importance in the fact that a large portion of the work of the Commission has been, and possibly will continue to be, the introduction of anadromous fish into the rivers of the State,—those varieties that have their feeding-grounds in the deep sea and lakes, and their cradles in the fresh-water streams and rivers.

LAWS.

In fish culture laws and regulations are needed, as in every other department of human activity, but they ought not to burden any compilation,—one or two or three specific and well-pointed enactments being better than a whole digest.

A law declaring the capture and appropriation of fish from any private stream, pond or fish preserve of any sort, against the owner's consent, to be larceny, is of paramount necessity—for that such taking and appropriation, judged by every just canon of definition or construction, *is stealing*, there can exist no rational doubt. It needs optics sharp to discern one single ray or line of difference distinguishing such offense from the one that abstracts property from the perch of the poultry yard, or from a sheepcote, and that hitherto widely prevailing mawkish sentimentality that seeks to palliate or grade down the offense into an ambling sort of a trespass, or something else, may suit the vocation of the shyster, but is no compliment to either the intelligence or ethics of any people. Hence a law,—not sugar-coated, nor of equivocal import, denominating in plain Saxon such malfeasance larceny, and requiring officers of the law to prosecute, juries to try, and courts, on conviction, to sentence, as in similar or other cases of larceny,—will alone meet the exigencies of the case. Such statutory provisions, securing the more perfect protection of this species of property, is the more needed at the present time, since these private fish farms or fisheries, now being established all through the State, not only represent a large property interest, but are become invaluable auxiliaries to the general fishery policy and work undertaken by the State.

But barring this or any other question of mere expediency, the law is claimed as one of clear, naked right,—one which inheres to good neighborhood and law-abiding citizenship everywhere, and cannot be denied except by a discrimination not warranted by law, reason, or common sense. The doctrine must obtain, that any citizen, every man, shall have a free and indisputable right or privilege to put his brain, his muscle, his time, or his capital, into any species or form of property he may elect, whether fish or cattle or sheep, or grain, or fruit, or flowers, and all and each interest shadowed and protected by the imperial ægis of one equal law. To this it must come, and the sooner the better. Let it come to be understood that the law, supported as it should be by a healthy public sentiment, is of equal force and application, and those lawless marauders and graceless vagabonds, who with the owl and the bat, wait their opportunity, will incontinently take to other occupation more in consonance with their cowardly natures, and all that prating of natural, inherent, prescriptive right, *et cetera*, will soon come to be regarded but the cheap babble of boys not graduated in any of the schools of the State, where good sense or good manners form a part of the course of instruction.

PROTECTIVE LAWS.

Laws, too, prescribing close times and regulating the utensils and methods of capture, whether by seine or weir, or spear or hook, grow out of the very necessities of the case, and can no more be dispensed with than can the rudder be detached from the ship and she ride on in safety. It is the absence or non-observance of these laws that has depleted many a stream and river, pond and

lake, of all their finny wealth and beauty. Now, it is immaterial with what outlay of time, and money, and pains-taking they be restocked, immaterial as to varieties or numbers, the great fact will still remain, that indiscriminate fishing, if tolerated, is indiscriminate slaughter and annihilation. And right here comes in the great work and duty of the true fish man. Careful to observe the law himself, he should lose no required opportunity or argument to indoctrinate possibly his more obtuse neighbor into a comprehension of the justice and necessity of the fishery regulations, but failing in this, he should be willing to assume the role of picket duty and see that the enemy cross not the legal fisherman's lines.

To the end that the laws may be observed and that the fish planted and to be planted, may receive that surer protection, unalterably essential to their growth and multiplication, it is earnestly recommended that fish clubs and organizations be formed in every section of the State. Such organizations, by very force of existence, as well as in the exercise of their appointed functions, will be a means and power of restraint over the lawlessly inclined. Evil disposed persons often show a respectful deference to authority when associated and organized. And those careless, thoughtless drones, that fungoid sort of growth, with which almost every community is inflicted, often have their mental, as well as moral perceptions quickened when they see a club advancing on their law-forgetting and law-defying footsteps.

Let individuals and clubs, all "lawful and true" friends of this movement take in its full import, weigh the absolute need of the literal observance of all our fish-laws, and evince a readiness to see to it that they are enforced, if this be done, as certainly as the harvest comes from the well-sown grain, so surely will we one of these days have good fishing in Michigan.

Protective laws are by no means peculiar to Michigan. All the fish States have them, and untold benefit has resulted from their operation. Indeed all the outlay and work of the several commissions proceed upon the assumption that these protective provisions are and will continue operative and of full effect. They vitalize, so to speak, the whole work, and their repeal or suspension even would be a virtual abandonment of the entire field.

THE WORK OF NATIONAL CONCERN.

Not only are the fish States alive to the importance of this subject, but the whole country is waking up and moving as a unit in the conviction that some action is eminently proper, if not imperatively needed, of a national character, to arrest the wanton waste and destruction that have followed in the wake of increasing population and wealth. The denizens of our waters and forests under the merciless and barbarian rule of poacher and pot-hunter, have decreased to such degree as to create a wide-spread feeling of alarm lest entire species and genus be numbered with the fauna already extinct. Hence, within the year, the subject of national organization and of co-operative and uniform laws, relating to the protection of stream and forest, has been discussed with every indication of the popular favor. Throughout the same zone or region of country, I see no good reason why there should not be concert and uniformity of action. Those sections of country, though they embrace several States, whose waters are essentially of a like chemical composition,—within the same range of natural and physical organization, and are governed by similar climatic, or other influences, may, with great appropriateness, and with every reasonable hope of a correlative advantage, become leagued, a body corporate, with power

to devise and to enforce such needful rules and regulations as relate to the common interest. By such alliance and concurrence of action, all seeming opposing interests not only become harmonized, but there will necessarily attach to their policy and acts, whatever they may be, a weight and authority of precedent and example of great value to the individual States.

CO-OPERATION.

Nine States, including West or Upper Canada, border upon what are termed the "Great Lakes." In a general view, every State of the Union—the country at large—is interested in the fish commerce of these Lakes, and in an increased fish production, if so it may be accomplished, by the appliances of fish laws and fish culture. But the States contiguous have possibly a more direct interest in whatever results shall be produced from the labor and the money appropriated and expended. It would therefore seem quite proper and just that the bordering States should make common cause of this enterprise, since by concurrent action not only more systematic and better work may be accomplished, but no feeling of antagonism nor occasion for distrust or jealousy of any sort can arise under the prosecution of a joint work, such as might possibly exist under separate State action. Section 5 of the Fish Act plainly enough contemplates such associated action. It reads: "In case appropriations by other States contiguous to the waters of the State of Michigan shall be made, and a disposition for a joint action with the State of Michigan be expressed, it shall devolve upon the Governor to communicate and arrange the action for the Commissioners with the Governors of said States." Now, several of the contiguous States have Fish Commissions, and have made appropriations, and others are expected soon to follow, and in default of the States either through their Legislatures or Executives, "expressing a disposition for a joint action," there can be no good reason why the Commissions of any such States as border on the Great Lakes may not confer with one another, and if deemed advisable, act conjointly. The several Commissions in very much of their duty are clothed with large discretionary power, and are certainly at liberty to adopt any means and measures, whether of a co-operative character or otherwise, which in their judgment will conduce to the largest and best returns.

PATIENTLY WAIT.

Many letters have been received exhibiting a degree of restiveness quite incompatible with a knowledge on the part of the writers of the incessant demands made upon the Fish Commission. A *must* have *his* lake stocked, B wants the stream that irrigates his farm attended to, and C thinks that Salmon will only do well in the lake that he fishes in on a rainy day, and D can't quite understand why the Commission haven't "hitched up" and pushed in ahead of engineers and railroads to plant in *his* forest-selvaged, silver lake a "few" of their one or two millions of White Fish. Now, to all such of our uneasy friends, who seem to show a greater facility for writing than for making fish almanacs, we must be permitted to say, patiently wait. Michigan is a tolerably sized State, containing a larger area of good water farming territory than any State of the Union, and it is an utter impossibility to put it all under good cultivation this year, or next year, or the year thereafter. The Commission have to feel and experiment their way in each advance step they take, so as to avoid, if possible, the taking of any backward steps. And such portions of the State as are of more easy access, and whose waters are more largely fre-

quented, and, in consequence, are, or should be, better protected, must, of necessity, be the primary fields of their experiment and endeavor. Nor can the more sparsely settled districts reasonably expect to receive in the distribution of the proceeds of the Commission's work share and share alike with the more densely populated sections of the State. All districts and sections of the State are equitably regarded, and Heaven willing and the appropriation not failing, all shall in due season receive the kind consideration of the Commission to the utmost verge of its powers and capabilities.

VOLUNTEER AID.

Remembering with every emotion of pleasure as well as with gratitude, the volunteer service rendered the Commission, I deduce therefrom an augury of no doubtful import, since no cause or measure can fail that evokes a free-will offering and endowment such as have been conferred on the fish-cultural enterprise. Its teaching is most plain, evidencing in language plainer than words that behind and away back of Fish Acts and of Fish Commissions are a heart and a purpose that have eliminated the very thought and possibility of failure. A latent, stalwart force, so existing, ready and willing, as opportunity offers, or occasion requires, to come to the front, undertakes its assumed task with a freshness and a vigor far exceeding any mere official routine work or stipendiary labor. Fortunate, indeed, is any enterprise that shall enlist it.

Consulting alone a personal feeling as touching volunteer work, most gladly would we individualize,—but this must not be done. In a general way only can the Commission express and record its sense of obligation and thanks.

Railroad engineers, out of sight of station or human habitation, in the weird shadows of the unbroken pine forests,—and such forests!—have whistled down their trains at the crossing of the river, the conductor, with the attaches of the train, voluntarily assisting in removing the twenty-four well filled cans of Salmon to the bottom of the sharp embankment below, and not forgetting, by the early morning-returning train, to apply the brakes to take aboard the tired depositors with their empty cans. If we cease to remember and to honor such kindness, "may our right hand forget its cunning and our voice cleave to the roof of its mouth."

Express companies, too, within the lines of a State jurisdiction, have permitted and *ordered* that cans of live fish "go!" and that they *stand not* on the *order* of their going, and the agents and employés of this service have uniformly been among the most courteous and obliging of all our fish acquaintances.

Steamboats also have made their decks for the "much-traveled" fish cans free, and accompanying fish depositors, on tender of compensation for "bed and board" accommodations, have been met with the blunt but frank answer, characteristic of the veteran tar, "your bills are paid." To hope that a merchant marine so generous and gallant may for many long years to come, float clear of every sandbar or rocky beach is quite superfluous.

Fish clubs and sporting associations, in not isolated instances, have voluntarily placed their services at the disposal of the Commission, and individual citizens, from every part of the State, have volunteered their aid, in many localities far in excess of the demand. And, generally, wherever we have been called, carrying with us the banner of our work, we have been met with the tender of horses and carriages and guides, and made the recipient of a uniform courtesy and hospitality, not less refreshing to the spirit than beneficial

to the duty in hand. To these various sources of aid we not less cheerfully than justly accord the credit of the flattering exhibit made by the Report, since many portions of the State have been reached with our cans which without such help could not have been supplied.

But, perhaps, more on this head need not be said. Holding in grateful recollection all parties and persons who thus unselfishly have regarded this great work and labor, our hope, twin of our faith, is that, throughout all the future years their *lines* may and will be *cast* in *pleasant* and goodly places.

CONCLUSION.

No apology do we deem necessary for the length of the Report. As it is the first of the Michigan Fish Reports, it seemed both proper and necessary to traverse many points and questions, of perhaps no very direct bearing, yet which sustain a most important correlation to the main subject.

Fishing abuses, and the consequent depletion of the waters therefrom,—the need and feasibility of restocking them,—the number, extent and worth of our rivers and lakes,—some description of the more valuable native fish, also of foreign varieties, with some of the reasons rendering proper attempts for their colonization,—fish culture, what it is, and the relations which it sustains to a class of interests too long neglected,—descriptions of State springs, ponds, hatching house, overseer's house, etc., etc., these could not well be omitted in the pioneer "Tract," but, of course, need not necessarily occupy any considerable space in subsequent Reports of the Commission.

And now, in concluding this review of the subject and of our labors, it may not be improper to state, that, in the entire work of the Commissioners and Superintendent, it has been their single wish and purpose to devise all and to do all with a view to permanency and to permanent good results. Believing aquaculture to be a valuable interest of the State, worthy to be placed alongside with our grain and fruit, salt, mining, lumber and manufacturing interests, nothing of a shoddy or temporary character has been allowed to enter into any portion of it. In this view, and with an unshaken faith in the old-time maxim, "What is worth doing at all is worth doing well," all their work has been conceived and performed. Instead of the letters and papers being kept in the Secretary's hat, or in his overcoat pocket, at a small expense an office has been fitted up with suitable desks and tables, drawers and shelves, where all the papers, books, letters and accounts are arranged and filed,—everything systemized, work performed with greatly increased facility, and, on the whole, is the padlock of security.

So, by an appropriation of a very few dollars, the nucleus of a *fish library* has been formed, constituting a focal point, not only for the collection of valuable charts, maps, books, magazines and papers, but affording most desirable conveniences for that arrangement and classification of agencies and results, which, while useful to the Commission as pointing the milestones of their progress, are of indispensable value and utility in the archives of the commonwealth. Fish culture, in its accepted modern signification and significance, is by no means the least of those institutions and industries which supplicate favor from that *central* power and beneficence that lives and pulsates in the vital organisms of the adopted children of the State, and thus believing, the Commission desire to look to its little library so founded and growing, as one of those gathered-up monuments that shall, through the many coming

decades of an honored history, fittingly memorialize both the wisdom and charity of the sovereign State.

With a like estimate of the well grounded and growing importance of this our enterprise, the ponds, the hatchery, the overseer's house, all have been constructed, each and all carefully, skillfully, and, as we think, economically planned and erected. So with our fish cans, fish utensils, and apparatus of every kind,—nothing in the entire equipment has been expended or spared believed to be in any way or degree essential to the more full and complete accomplishment of the work undertaken by the Commission.

We point, with a feeling born of pride mingled with satisfaction, to what the State has already accomplished in the brief period covered by the Report. With the foundations so laid, the future is full of promise. All things seem to invite and beckon on to those larger and grander aquacultural operations and successes which, ere long, shall place Michigan in the foremost rank of the fish States.

To this consummation we kindly invoke from both people and Legislature such favorable consideration of this, Michigan's new-born industry, as comports with its intrinsic merits, and as shall encourage and strengthen the hands of those its public servants, to whom have been and are confided the great and multiplied interests of fish farming.

GEO. H. JEROME,
Superintendent of State Fisheries.

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APPENDIX.

COMMUNICATION OF HON. GEORGE CLARK, OF ECORSE.

Mr. Clark's almost half-century fishing experience, and his thorough acquaintance with the White Fish, and with our early State fisheries, renders the appended communication one of great interest.

We feel certain all persons in any degree interested in the State Fishery question will rejoice in the opportunity of learning the views of one so well and thoroughly posted on the subject of which he writes:

GEO. H. JEROME, *State Superintendent:*

DEAR SIR,—It may be proper, as I am one of the Fish Commissioners, and have had forty odd years' experience in fishing in this State, to relate part of my experience as to the decrease of the fish, and what I think it would be advisable to do in regard to restocking the waters of our State with commercial and eatable fish.

Nature had so arranged the order of animal life in the waters that the lakes, bays, straits and rivers were abundantly supplied with fish, and their food adapted to the varieties of fish in their localities.

The fish were of much benefit to the first settlers of the State as food. In 1830, Maumee River probably afforded more fresh-water fish, and more varieties, than any other river known. There were some thirty odd varieties, of which the wall-eyed pickerel were the principal fish, some weighing from twelve to eighteen pounds. Maskinonge, pike, white and black bass, catfish, and many other varieties were caught, salted and sold fresh each year for food, amounting to some thousands of barrels yearly. And since that date, by excessive fishing with many kinds of net, set lines and spearing, the fish are so reduced that there is but little fishing at this time, and very few fish caught in the river.

In the Detroit River, about a mile below Woodward Avenue, in the month of May, 1829, and a number of years after, S. Gilliot caught and packed five hundred barrels yearly of wall-eyed pickerel, besides what were used and sold

fresh. And at Presque Isle, about six miles above Detroit, at the outlet of Lake St. Clair, S. Gilliot and others caught in about the same proportion, and on the river now, in the same month, probably there could not be more than twenty barrels caught of the same kind and varieties of fish. I fished at Fort Gratiot, at the outlet of Lake Huron, in the months of May and June, from 1830 for twelve years or more, and averaged from eight to twelve hundred barrels wall-eyed pickerel yearly, besides what were used and sold fresh, and other fishermen averaged nearly the same. And now at the same fishery where I fished probably they are not catching over fifty barrels, and other fisheries have decreased in about the same proportion.

In 1829, and for many years after, White Fish were caught plentifully at nearly any point on the shores and islands of the Detroit River and part of St. Clair River.

Most of the fishing was done by the French with canoes and small nets. About this time on Grosse Island, at McComb & Lewis fishing ground, it was quite common to catch from one thousand to five thousand whitefish at one sweep with a seine, and Campau on Belle Isle, and S. Gilliott and others at Presque Isle, caught in about the same proportion for a number of years. And now there are but few points, compared with former fishing, where White Fish can be caught to any amount, and it requires the best of seines and fixtures to catch them. White Fish were plenty along the shore of the lower end of Lake Huron, in 1837 and for a number of years after, and were caught with sweep nets and gill nets. In 1838 I fished on the shores of Lake Huron about sixteen miles from Fort Gratiot, and salted and put up hundreds of barrels of White Fish.

I remember, at one haul I caught White Fish that weighed from one-fourth of a pound to fifteen pounds, and from this haul I picked out White Fish enough that weighed two pounds and upwards to make twenty odd barrels.

I estimated that there were at this haul probably from four to six thousand fish, large and small.

They seemed to be a family of fish, both young and old, come from the cold water into the warm shoal water near the shore for the purpose of feeding. I examined the stomachs of a number of them, and found them partially filled with small gravel, small round-pointed snails, small clams or mussels the size of a pea, and three varieties of worms. The lake was calm, and they were caught with a seventy-fathom net.

About this time it was quite common to catch White Fish at Fort Gratiot after a storm that drove them down out of the lake, and I caught at one time in three days three hundred barrels, averaging considerably larger than those in the Detroit River and Lake Erie, and now there are scarcely any White Fish caught there or on the lake shore above.

It has been the practice to fish along the shores of the lakes with gill nets and pound nets, and catching large quantities of White Fish, and, as a general thing, catching nearly all the fish out in that locality in two or three years, and then moving to a new locality and going through the same process, until the most of the shores of the lakes have been fished over, and have caught the fish out.

It is thought, by the best judges, they are not catching twenty-five per cent of what they were catching a few years ago.

Prof. Baird, U. S. Fish Commissioner, caused an examination of the lakes and the fisheries to be made by Prof. Milner, and from his report and the

experience of the Commissioners, Prof. Baird expressed himself to Gov. Bagley that our waters may be mostly restocked with fish.

And from the experience of N. W. Clark, Seth Green and Mr. Wilmot, of Ontario, in hatching White Fish, and our State Fish *Commission's experience*, I think that the waters of our State may be fully or nearly restocked with White Fish if *proper means* are *used*, as we have the waters, with *food* in the water, for millions of fish.

We should improve the facilities and experience we have for supplying the public with commercial and cheap food fish. If we could have abundance of fish in case of scarcity of meat by disease or other causes, it would be of great benefit to the public, and might partially prevent a famine, as I have never noticed an *epidemic* or general *disease* of the fishes in all my experience, and the dry or wet seasons don't seem to affect the fish as to food and health as it does animal life on land.

I would recommend the propagation of White Fish as the *principal* commercial food fish. There seems to be more *food* adapted to the *White Fish* than to any other variety of fish, as they feed partly by *suction* on the *bottom* of the lakes. I would commence and plant the young fry at favorable points in the lakes and rivers of this State, and in the largest and deepest of the inland lakes, and, as the *black bass* are a *gamy* fish, and seem to find *food* and to *adapt* themselves to most of our waters, they will feed on almost any *kind* of animal life found in or on the water, different in some respects from any other fish I know. I would plant them and some other varieties in the smaller inland lakes.

We should continue to introduce the salmon and shad, for there is no doubt but they will find food and run up our rivers into the country, as they run up the rivers in the Eastern States.

As the kind of fish and fowls have been mostly caught and driven away that devour the eggs of the lizards and the young lizards, the lizards in our waters seem to be increasing rapidly and are found on the *spawning* ground eating the *fish eggs*. I have caught them, so *gorged* with White Fish eggs that, by throwing them on the ground, the eggs would fly out of their mouths, numbering from six to eight hundred, and each lizard had probably devoured *half* the eggs of a *White Fish* at one time. The young lizards are very clumsy and *helpless*, lying on the bottom in shoal water for some time after they are hatched.

The eggs of the lizard are attached separately to the *under sides* of wood, sticks and other things lying on the bottom of the river, mostly in shoal water.

If found by *experimenting* that the eels would eat the young lizards, it would be well to introduce the eels for a double purpose, for food and as a scavenger.

Yours,

GEO. CLARK.

Ecorse, Sept. 20, 1874.

UNITED STATES FISHERY ACT.

The appended Bill is of special importance to the people of Michigan, as its provisions are in the interest of the lake fisheries as well as the coast. Besides, it will be noticed that it was under this Act that a U. S. Fish Commissioner was appointed and the U. S. Fish Commission established,—a Bureau that has rendered to the Michigan Fish Commission, as well as to other State Commissions, services greatly prized and of almost inestimable value. Hence its insertion here is not only proper, but its omission would be a missing link much to be deplored in the chain of our Report.

JOINT RESOLUTION for the protection and preservation of the food-fishes of the coast and lakes of the United States.

Whereas it is asserted that the most valuable food-fishes of the coast and the lakes of the United States are rapidly diminishing in number, to the public injury, and so as materially to affect the interests of trade and commerce: Therefore,

Be it resolved by the Senate and House of Representatives of the United States of America, in Congress assembled, That the President be, and he hereby is, authorized and required to appoint, by and with the advice and consent of the Senate, from among the civil officers or employés of the Government, one person of proved scientific and practical acquaintance with the fishes of the coast, to be Commissioner of Fish and Fisheries, to serve without additional salary.

SEC. 2. *And be it further resolved*, That it shall be the duty of said Commisioner to prosecute investigations and inquiries on the subject, with the view of ascertaining whether any and what diminution in the number of the food-fishes of the coast and the lakes of the United States has taken place; and, if so, to what causes the same is due; and also whether any protective, prohibitory, or precautionary measures should be adopted in the premises; and to report upon the same to Congress.

SEC. 3. *And be it further resolved*, That the heads of the Executive Departments be, and they are hereby, directed to cause to be rendered all necessary and practicable aid to the said Commissioner in the prosecution of the investigations and inquiries aforesaid.

SEC. 4. *And be it further resolved*, That it shall be lawful for said Commissioner to take, or cause to be taken, at all times, in the waters of the sea-coast of the United States, where the tide ebbs and flows, and also in the waters of the lakes, such fish or specimens thereof as may in his judgment, from time to time, be needful or proper for the conduct of his duties as aforesaid, any law, custom, or usage of any State to the contrary notwithstanding.

Approved February 9, 1871.

ACT CREATING THE BOARD OF FISH COMMISSIONERS.

[No. 124.]

AN ACT to establish a Board of Commissioners to increase the product of the fisheries, and to make an appropriation therefor.

SECTION 1. *The People of the State of Michigan enact*, That it shall be the duty of the Governor, by and with the consent of the Senate, to appoint two persons, residents of this State, who, with the Governor, shall constitute a Board of Fish Commissioners. The persons so appointed shall hold their office until the expiration of the next regular session of the Legislature, whose duty it shall be to select a suitable location for a State fish-breeding establishment, for the artificial propagation and cultivation of White Fish and such other kinds of the better class of food-fishes as they may direct, upon the best terms possible. Said Board may receive from the State Treasurer all the expenses actually disbursed by them while in discharge of their respective duties.

SEC. 2. It shall be the duty of said Board to appoint one Superintendent of Fisheries of the State, whose duty it shall be to obtain the ova from such fish, and at such places as said Board may direct, take charge of the establishment during the hatching seasons, and report to the Governor annually upon the practical results and success of the enterprise; at a salary, however, not to exceed twelve hundred dollars per annum.

SEC. 3. The said Board may take, or cause to be taken, any fish in any manner or at any time, for purposes connected with fish-culture or with scientific observation. And it shall further devolve upon said Board to supervise generally the fishing interests and secure the enforcement of all the laws relating to the protection of fish and fisheries in the State.

SEC. 4. The sum of seven thousand five hundred dollars is hereby appropriated for the year eighteen hundred and seventy-three, and a like sum for the year eighteen hundred and seventy-four, for the necessary expenses in carrying this act into effect, which the Treasurer shall pay to them on the warrant of the Auditor General, from time to time, as their vouchers for such expenses shall be exhibited and approved.

SEC. 5. In case appropriations by other States contiguous to the waters of the State of Michigan shall be made, and a disposition for a joint action with the State of Michigan be expressed, it shall devolve upon the Governor to communicate and arrange the action for the said Commissioners, with the Governors of said States.

Approved April 19, 1873.

GENERAL FISH LAWS.

GENERAL LAW ON THE PROTECTION OF FISH AND PRESERVATION OF FISHERIES.

"AN ACT to protect fish and preserve the fisheries of this State."

[*Approved March 21, 1865. Laws of 1865, p. 717.*]

(2072.) SECTION 1. *The People of the State of Michigan enact*, That it shall be unlawful for all persons to put into any of the waters of this State, where fish are taken, any offal, blood, putrid brine, putrid fish, or filth of any description; and any person so offending shall be fined in any sum not exceeding three hundred dollars, or imprisonment not exceeding thirty days, or both, at the discretion of the court.

(2073.) SEC. 2. All fish, offal, or filth of any description whatsoever, accruing from the catching and curing of fish, shall be burned or buried ten rods distant from the beach or shore of the river or lake.

(2074.) SEC. 3. The size of the meshes of all the lead of pound or trap nets, used in the waters of this State, shall not be less than five inches in extension, knot to knot; and the size of the meshes of all the pot of said nets, shall not be less than two and a half inches in extension, knot to knot, in pound or trap nets used for catching White Fish; and the size of the meshes of all the lead of pound or trap nets used in catching other kinds of fish, shall not be less than four inches in extension, knot to knot; and the size of the meshes of all the pot of said pound or trap nets shall not be less than two inches in extension, knot to knot, under penalty and on pain of forfeiture of the nets, or fine not exceeding three hundred dollars, or both, at the discretion of the court: *Provided*, That the penalties of this section shall not apply or work injury to persons who are the present owners of pound or trap nets, but apply to all pound or trap nets hereafter manufactured.

(2075.) SEC. 4. The spawn of all the White Fish caught shall be forthwith deposited, by all persons catching said fish, in the waters in or near the spawning places from which said fish were taken.

(2076.) SEC. 5. No Speckled Trout shall be killed at any time, by means of nets or seines, in any inland lake, river, or stream.

(2077.) SEC. 6. Any act in contravention of sections two, four, and five of this act, shall subject all parties concerned in the breach of the said sections, whether the actual transgressors or accessories, to a penalty of not more than one hundred dollars nor less than twenty-five dollars with all expense of prosecution, or to imprisonment in the county jail for a period not exceeding thirty days, or both, at the discretion of the court.

(2078.) SEC. 7. The board of supervisors of each, or a majority of them, shall, from time to time, make rules and regulations for regulating the fishing with pound or trap nets, gill nets and line, and all manner of fishing tackle carried on upon all lake and river shores, or upon any water adjacent to or passing through any county of this State.

(2079.) SEC. 8. The board of supervisors of each county, or a majority of them, shall grant, on the application of any transient or non-resident person or persons, a written permission or license for one year, for each and every pound or trap net used, on payment of fifty dollars legal money. All persons concerned in the breach of this act, shall forfeit the sum of one hundred dollars, with all costs of suit. It shall be the duty of the board of supervisors, or a majority of them, to enforce the provisions of this act; and all moneys accruing from fishing licenses and forfeitures shall be paid over to the county treasurer.

(2080.) SEC. 9. All forfeitures occurring under sections one, two, three, four, five, six, eight, and nine of this act may be recovered by action of debt, with costs of suit, before any court of competent jurisdiction, one moiety thereof to the person who sues for the same, and the other moiety to be paid into the hands of the county treasurer, which [shall] be exclusively used as a pauper fund.

(2081.) SEC. 10. It shall be unlawful for any person or persons to put into any of the waters fronting or bordering land where fish are taken by the legal owner or occupant of such lands any vessel or ship ballast, stone, sand, coal cinder, ashes, log slabs, decayed wood, bark, saw-dust, or obstruction, or filth of any other description, or to place or drive

any pound net piles or stakes, or any other piles or stakes, or posts, or build any platforms or piers, or any species of seines or continuous trap nets, to the extent of the breadth of such legal owner or occupant's lands so far as the channel banks of the rivers, and to one mile from the beach or shore, at low-water mark of the lakes, straits, inlets, and bays on said wajers fronting such owner or occupant's lands, and it shall subject any boat owner, or captain of any vessel, to a fine of not exceeding fifty dollars, who shall willfully run into or molest any pound net, trap, or other stationary nets, or fixtures set in the lakes for fishing purposes.[1]

(2082.) SEC. 11. Any person or persons offending against the provisions of section ten of this act shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be liable to a fine not exceeding one hundred dollars, or imprisonment in the county jail not more than ninety days, or both such fine and imprisonment, in the discretion of the court; and such person or persons shall also be liable civilly for all damages done such fishing grounds to the legal owners or occupants thereof, to be recovered in an action of trespass, in any court of the county where such fishing grounds may be situate, having jurisdiction thereof.[1]

AN ACT to prevent fishing with seines and every kind of continuous nets, in the waters of the counties of Branch, Livingston, Cass, St. Joseph, Kent, Ionia, Genesee, and Calhoun, or in any of the lakes, rivers, or streams of Macomb county.

[*Approved March 9, 1867. Laws of 1867, p. 58.*]

(2083.) SECTION 1. *The People of the State of Michigan enact*, That it shall not be lawful hereafter to fish with seines or any species of continuous nets in any of the inland lakes or small streams of the counties of Branch, Livingston, Cass, St. Joseph, Kent, Ionia, Genesee, and Calhoun, nor in any of the lakes, rivers, or streams of Macomb county.

(2084.) SEC. 2. Any person offending against any of the provisions of this act, shall, on conviction thereof, be liable to a fine of not more than one hundred dollars, or imprisonment in the county jail not more than sixty days, to be determined by a court of competent jurisdiction.

AN ACT to amend an act entitled "An act to amend an act to amend an act to prevent fishing with seines and every kind of nets in certain counties in the State of Michigan," approved March sixteenth, eighteen hundred and sixty-one.[2]

[*Approved March 4, 1865. Laws of 1865, p. 163.*]

SECTION 1. *The People of the State of Michigan enact*, That section one of an act entitled "An act to amend an act entitled 'An act to prevent fishing with seines and every kind of nets, in certain counties in the State of Michigan,'" and approved March sixteenth, eighteen hundred and sixty-one, be and the same is hereby amended so as to read as follows:

(2085.) SECTION 1. That it shall not be lawful hereafter to fish with seines, or any species of continuous nets, in any of the inland lakes or small streams of the counties of Jackson, Hillsdale, Washtenaw, Van Buren, Calhoun, Kalamazoo, Barry, Eaton, and the townships of Rollin, Medina, Seneca, Dover, Hudson, Cambridge, Franklin, and Woodstock, in Lenawee county.

(2086.) SEC. 2. Any person offending against any of the provisions of this act shall, on conviction thereof, be liable to a fine of not over one hundred dollars, or imprisonment in the county jail not over sixty days, to be determined by a court of competent jurisdiction.

SEC. 3. This act shall take immediate effect.

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[1] As added by Act 94 of the Laws of 1869, p. 159, approved and took effect April 2, 1869.

[2] This amendatory act inserted in the place of the original, as it supersedes it.

AN ACT to prevent fishing with seines and pound and trap nets in the small inland lakes and streams in the State of Michigan.

[*Approved March 16, 1865. Laws of 1865, p. 352.*]

(2087.) SECTION 1. *The People of the State of Michigan enact*, That it shall not be lawful hereafter to fish with seines, trap nets, pound nets, or any species of continuous nets, in any of the inland lakes or small streams of all the territory, according to the United States survey, north of the township line numbered twenty north.

(2088.) SEC. 2. Any person offending against the provisions of this act shall, on conviction thereof, be liable to a fine of not over one hundred dollars, or imprisonment in the county jail not over sixty days, to be determined by a court of competent jurisdiction.

AN ACT to amend an act entitled "An act to provide for the erection and maintenance of shutes for the passage of fish through the dams across the streams of this State."[1]

[*Approved March 21, 1865. Laws of 1865, p. 685.*]

(2089.) SECTION 1. *The People of the State of Michigan enact*, That an act entitled "An act to provide for the erection and maintenance of shutes for the passage of fish through the dams across the streams in this State," approved March sixteenth, in the year of our Lord eighteen hundred and sixty-one, be and the same is hereby amended so as to read as follows:

(2090.) SEC. 2. There shall be erected and maintained in each dam across any stream which by law is a public highway, by the owner or occupant thereof, or by those persons using the waters thereof, through the medium of any canal or race, sufficient and permanent shutes to admit the passage of fish in such stream during the months of April, May, and June in each year: and if the owner of or occupant of any such dam, or person or persons using the water thereof, through the medium of any canal or race, shall neglect or refuse, for the period of sixty days, to construct and maintain such shutes, as aforesaid, whenever requested, in writing, so to do by any ten freeholders of the same county, such person or persons shall be deemed guilty of a misdemeanor, and for each and every sixty days that such person or persons shall so neglect or refuse, he or they shall be punished by a fine not exceeding one hundred dollars, or by imprisonment in the county jail not exceeding ninety days, or by both such fine and imprisonment, in the discretion of the court.[2]

(2091.) SEC. 3. Whoever obstructs the main channel or course of any river or creek, by placing therein nets or fishing apparatus of any kind whatever, for the purpose of taking or stopping fish of any kind, shall thereby incur, for each offense, a fine not exceeding twenty-five dollars; and in no case shall the said channel or course, so left open, be less than one-third of the whole breadth of the river.

AN ACT to prevent the obstruction of the free passage of fish along streams and inland rivers, by the interposition of fish weirs, weir dams, or weir nets.

[*Approved March 30, 1869. Laws of 1869, p. 115.*]

(2092.) SECTION 1. *The People of the State of Michigan enact*, That it shall not be lawful for any person or persons to place a weir dam, fish weir, or weir net, across any race, drain, stream, or inland river of this State, in such a manner as to obstruct the free passage of fish up and down the same; and any person violating the provisions of this act shall be liable to a penalty of not less than five nor more than fifty dollars for each such violation, and also for the payment of two dollars additional penalty for every day he shall continue to keep up such fish weir or weir net, in violation of this act, after having been duly notified by any elector of the township wherein such fish weir or weir net may be, feeling himself aggrieved thereby, to remove the same; said penalty or penalties to be recovered before any court of competent jurisdiction, in the township or county where such offense shall have been committed.

SEC. 2. This act shall take immediate effect.

[1] This amendatory act is inserted in the place of the original, as it supersedes it.
[2] As amended by Act 66 of the Laws of 1867, p. 94, approved March 20, 1867.

AMENDMENTS TO GENERAL FISH LAW.

The following are the amendments of the General Law:

AN ACT to amend section two thousand and eighty-seven of the compiled laws of eighteen hundred and seventy-one, being section one of an act entitled "An act to prevent fishing with seines and pound or trap-nets in the small inland lakes and streams in the State of Michigan," approved March eleven, eighteen hundred and sixty-five.

SECTION 1. *The People of the State of Michigan enact*, That section two thousand and eighty-seven of the compiled laws of eighteen hundred and seventy-one be and the same is hereby amended so as to read as follows:

(2087.) SECTION 1. *The People of the State of Michigan enact*, That it shall not be lawful hereafter at any time to fish with seines, trap-nets, pound nets, dip-nets, or any species of continuous nets, or during the months of March, April, May, and June, by spearing or shooting in any of the waters of the State of Michigan, except Lakes Michigan, Superior, Huron, St. Clair, the St. Clair and the Detroit Rivers, and Lake Erie: *Provided*, Nothing in this act shall be construed as prohibiting the sole owners of fish-ponds from fishing therein, as they may think proper.

Approved March 27, 1873.

AN ACT to amend section five of an act entitled "An act to protect fish and preserve the fisheries of this State," approved March twenty-first, eighteen hundred and sixty-five, being section two thousand and seventy-six of the compiled laws of eighteen hundred and seventy-one.

SECTION 1. *The People of the State of Michigan enact*, That section five (5) of an act entitled "An act to protect fish and preserve the fisheries of this State," be and the same is hereby amended so as to read as follows: No speckled trout or grayling shall be killed at any time by means of nets, traps, or seines, in any inland lake, river, or stream, nor by any other means, between the first day of October and the first day of April next succeeding.

Approved April 15, 1873.

GAME LAWS.

The protection of game, and the preservation of elk, deer, birds, and wild fowl, are so intimately connected with the subject of fish-culture and the preservation of our waters and fisheries, that it is deemed proper to give the Game Laws a place with the compiled Fish Laws. Parties having occasion to refer to either classes will find the reference under one head of great convenience:

THE GAME LAWS OF MICHIGAN.

AN ACT to revise and consolidate the several acts relating to the protection of game, and for the better preservation of elk, deer, birds, and wild fowl."

[*Approved April 3, 1869. Laws of 1869, p. 211.*]

(2093.) SECTION 1. *The People of the State of Michigan enact*, That no person or persons shall pursue, or hunt, or kill any wild elk, wild buck, doe, or fawn, save only during the months of October, November, and December in each year, or kill or destroy, by any means whatever, or attempt to take or destroy any wild turkey at any time during the year, except in the months of September, October, November, and December, in each year; or kill or destroy, by any means whatever, any woodcock until after the fifth day of July, nor any prairie chicken, or pinnated grouse, ruffled grouse, commonly called partridge, or pheasant, or any wood duck, teal duck, or mallard duck, save only from the fifth day of August in each year to the first day of February next following.[1]

(2094.) SEC. 2. No person or persons shall kill or destroy, or attempt to kill or destroy, any quail, sometimes called Virginia partridge, save only during the months of October, November, and December, in each year; and no person or persons shall kill or destroy any quail in this State, at any time after the passage of this act, until the first day of October, eighteen hundred and seventy-two, under a penalty of five dollars for each quail destroyed.[1]

(2095.) SEC. 3. No person or persons shall at any time, with a trap, or snare, or net, take any partridge, prairie chicken, wood duck, teal duck, mallard duck, or quail, or attempt to take, with any trap, snare, or net, any partridge, prairie chicken, or quail: *Provided, however*, That it shall be lawful to trap quail and take them alive, for the purpose of keeping them alive through the winter, and for no other purpose whatever; and it shall also be lawful to take with a trap, snare, or net, any wood duck, teal duck, or mallard duck for breeding purposes.[1]

(2096.) SEC. 4. No person or persons shall at any time kill or attempt to kill any wild duck, or other wild fowl, with or by means of a swivel or punt gun, or rob or destroy the nests of any wild ducks or wild geese, or in any manner kill or molest the same whilst they are sitting at night on their nesting places.

(2097.) SEC. 5. No person or persons shall sell, or expose for sale, or have in his or her possession for the purpose of selling or exposing for sale, any of the birds or animals protected by this act after the expiration of thirty days next succeeding the times limited and prescribed for the killing of any such birds or animals: *Provided, however*, That it shall be lawful to expose for sale, and to sell, any live quail for the purpose of preserving the same alive through the winter.[1]

(2098.) SEC. 6. Any person or persons violating any of the foregoing provisions of this act shall be deemed guilty of a misdemeanor, and shall likewise be liable to a penalty of fifty dollars for each offense, and shall, on conviction thereof, stand committed to the common jail until such penalty is paid, provided that such imprisonment shall not exceed thirty days.

(2099.) SEC. 7. No person shall at any time, within this State, kill any robin, nighthawk, whipporwill, finch, thrush, lark, sparrow, cherry bird, swallow, yellow bird, blue

[1] As amended by Act 135 of the Laws of 1871, p. 212, approved and took effect April 15, 1871.

bird, brown thrasher, wren, martin, oriole, woodpecker, bobolink, or any song bird, nor rob the nests of such birds, under a penalty of five dollars for each bird so killed, and for each nest so robbed.

(2100.) SEC. 8. That any railroad, express company, or other common carrier, or any of their agents or servants, or other persons having any of the above named birds or animals in their possession for transportation, or shall transport the same, after the expiration of thirty days next succeeding the times limited and prescribed for the killing of such birds or animals, shall be punished by fine not less than ten dollars nor more than one hundred dollars: *Provided*, That such penalty shall not apply to the transportation of live quail which are to be kept alive through the winter, or to the transportation of such birds or animals *in transitu* through this State from other States where it is lawful to kill such birds or animals at the time of such transportation.[1]

(2101.) SEC. 9. No person or persons shall use any gun or guns, or fire-arms, to maim kill, or destroy any wild pigeon or pigeons, at or within one-half mile of the place or place, where they are gathered in bodies for the purpose of brooding their young, known as pigeon nestings; and no person or persons shall use any gun, guns, or fire-arms, to maim, kill, or destroy any wild pigeon or pigeons within their roostings, anywhere within the limits of this State; and every person so offending against the provisions of this section, or any part thereof, shall be subject to a penalty of fifty dollars, with costs of suit.

(2102.) SEC. 10. A prosecution may be brought by any person in the name of the people of the State of Michigan, against any person or persons violating any of the provisions of this act, before any justice of the peace of the county in which such violation is alleged to have taken place, or before any court of competent jurisdiction; and it is made the duty of all prosecuting attorneys in this State to see that the provisions of this act are enforced in their respective counties, and they shall prosecute all offenders, on receiving information of the violation of any of the provisions of this act; and it is made the duty of sheriffs, under sheriffs, deputy-sheriffs, constables, and police-officers, to inform against and prosecute all persons whom there is probable cause to believe are guilty of violating any of the provisions of this act.

(2103.) SEC. 11. The provisions of this act shall not apply to any person who shall kill any of the birds or animals protected by this act, for the sole purpose of preserving them as specimens for scientific purposes, nor to any person who shall collect the eggs or nests of any bird for such scientific purposes: *Provided*, That in a prosecution for the violation of any of the provisions of this act, it shall not be necessary for the prosecution to prove that the killing of the bird or animal, or the taking of the nest or eggs, as the case may be, was not done for scientific purposes.

(2104.) SEC. 12. All prosecutions under the provisions of this act shall be commenced within three months from the time such offense was committed.

(2105.) SEC. 13. All acts and parts of acts contravening any of the provisions of this act are hereby repealed.

AN ACT to prevent the destruction of muskrats and muskrat houses, in the marshes along the shore of Lakes Erie, St. Clair, Huron, and Michigan.

[*Approved April 3, 1869. Laws of 1869, p. 187.*]

(2106.) SECTION 1. *The People of the State of Michigan enact*, That no person or persons shall kill, destroy, or take, by any means whatsoever, within the limits of the marshes bordering on the waters of Lake Erie, Detroit River, Lake St. Clair, River St. Clair, Lake Huron, and Lake Michigan, any muskrat found in said marshes, or in or on the banks of any bayous or creeks in said marshes, between the fifteenth day of April and the first day of January, under the penalty of three dollars for each muskrat so killed, destroyed, or taken in violation of this act.

(2107.) SEC. 2. It shall be unlawful for any person or persons to destroy or disturb any muskrat house in said marshes, under a penalty of five dollars for each muskrat house destroyed in violation of this act.

(2108.) SEC. 3. Every penalty prescribed by the preceding sections of this act shall be sued for in the name of the people of the State of Michigan, before any justice of the peace in the county where the alleged offense was committed, which suit shall be commenced and

[1] Vide note to Section 1 of this Act.

carried on in the same manner that prosecutions for misdemeanors are, and the penalties collected in pursuance of this act shall be paid into the county treasury of the county where the offense was committed, for the support of the township libraries of such county.

(2109) SEC. 4. This act shall not be so construed as to prevent the catching and killing of any animals specified in the foregoing sections, where there is danger of their doing injury to property, either public or private.

AN ACT to amend section one of an act entitled an "An act to revise and consolidate the several acts relating to the protection of game, and for the better preservation of elk, deer, birds, and wild fowl," approved April 3rd, eighteen hundred and sixty-nine, being section two thousand and ninety-three of the compiled laws of eighteen hundred and seventy-one.

SECTION 1. *The People of the State of Michigan enact*, That section one of an act, entitled "An act to revise and consolidate the several acts relating to the protection of game, and for the better preservation of elk, deer, birds, and wild fowl," approved April three, eighteen hundred and sixty-nine, being section two thousand and ninety-three of the compiled laws of eighteen hundred and seventy-one, be and the same is hereby amended so as to read as follows:

(2093.) SECTION 1. *The People of the State of Michigan enact*, That no person or persons shall pursue, or hunt, or kill any wild elk, wild buck, doe, or fawn, save only during the months of October, November, and December in each year; or kill or destroy by any means whatever, or attempt to take or destroy any wild turkey at any time during the year, except in the months of September, October, November, and December in each year; or kill or destroy, by any means whatever, any woodcock until after the fifth day of July; or any prairie chicken, or pinnated grouse, ruffled grouse, commonly called partridge or pheasant, or any wood duck, teal duck, or mallard duck, save only from the first day of September in each year to the first day of January next following.

Approved March 27, 1873.

FINANCIAL STATEMENT,

OF THE FISH COMMISSIONERS, COVERING EXPENDITURES FROM MAY 12TH 1873 TO DECEMBER 1ST, 1874.

DEBIT.

To appropriation by Act No. 124, Laws of 1873	$15,000 00
To sale of old windows forwarded from State Penitentiary	2 50
To money refunded by Express Company from overcharge on crate of California Salmon ova	10 00
Total fund	$15,012 50

CREDIT.

By amount expended for Maine Salmon, 1873	$ 346 70	
By amount expended for shad of 1873	472 82	
By amount expended for office for Commission and Superintendent	100 00	
By amount expended for stationery, printing, advertising, letter press, letter files, and Record Books	119 04	
By amount expended for postage	65 08	
By amount expended for fish library, covering express charges on papers and books	37 60	
By amount expended for examination of water sites for State Hatchery	68 20	
By amount expended for Lake Trout	109 00	
By amount expended for sixty-seven fish cans	311 25	
By amount expended for California Salmon of 1873	212 60	
By amount expended for erecting State Hatchery and three ponds, including all materials	1,192 01	
By amount expended for troughs, screens, tools, furniture, covering entire equipment for hatching fish ova	518 60	
By amount expended for nine fish preserves, fencing springs, and constructing passage ways, including materials	179 92	
By amount expended for erecting Overseer's House, including all materials	396 00	
By amount expended for Insurance, State Hatchery, and furniture and Overseer's House	11 38	
By amount expended for care of State Hatchery and of fish in ponds	58 82	
By amount expended for painting Hatchery, Overseer's house, and varnishing screens, including materials	100 42	
By amount expended for White Fish, covering all expenses, procuring and hatching ova and planting fish	2,312 06	
By amount expended for Maine and land-locked Salmon of 1873	532 03	
By amount expended for California Salmon of 1874	423 20	
By amount expended for seal and dies for marking cans and other articles	13 12	
By amount expended for fish exhibition at State Fair of 1874	33 20	
By amount paid Charles Michael, Overseer of State Hatchery and grounds	300 00	
By amount paid Geo. H. Jerome, Superintendent of State Fisheries	1,400 00	
Total expenditures	$9,313 05	
Balance on hand December 1st, 1874	5,699 45	
		$15,012 50

Vouchers for the various items of expenditure, as enumerated above, are on file in the Auditor General's office.

INVENTORY

OF BUILDINGS, FURNITURE, GOODS AND MATERIALS, AND OTHER PROPERTY IN CHARGE OF THE MICHIGAN FISH COMMISSIONERS, ON HAND DECEMBER 1ST, 1874.

1 State Hatching House and Fishery	$1,192 01
1 Overseer's House	396 00
9 fish preserves, fence and passage ways	179 92
67 fish cans for planting fish	311 25
1 hand saw	1 00
1 basket for papers and tools	50
2 wheelbarrows	5 00
36 iron gates, or faucets	24 00
1 dirt shovel	1 25
1 scoop shovel	1 50
1 steel rake	1 25
1 grub axe	1 50
6 large tin pails	4 50
6 dippers	1 50
2 varnish brushes	1 20
2 large paint brushes	1 50
1 small paint brush	80
1 five-gallon tin can, for oil or kerosene	1 50
1 heating stove	17 00
146 pounds stove-pipe	14 60
1 cook stove, pipe and furniture	24 50
1 bedstead	2 00
1 mattrass	4 00
4 sheets	4 00
4 pillow cases	1 70
1 pair blankets	3 00
4 comforters	8 30
2 pillows	3 00
4 chairs	1 00
1 table	3 00
1 two-bushel basket	75
250 feet of pump-logs, three-inch bore	35 00
60 pump log thimbles	4 70
1 copy-bookpress	8 00
1 copy-book water-holder	1 00
1 copy-book brush	1 00
1 waste-basket	75
3 rubber tube syphons	2 25
3 tin tubes for using syphons	1 50
10 syphon tubes	3 30
44 feet rubber tubing	9 00
2 thermometers	1 50
4 wooden pails	1 00
2 large-size wash-tubs	2 00
4 small copper scoops	1 00
1 watering-pail for ova	1 00
2 lanterns	2 50
1 lamp	1 00
1 pair shears for sheet-iron	1 00
1 pair window-curtains	50

18 fish egg troughs, with tray fixtures	$108 00
1 buck saw	1 50
1 ice pick	50
1 pair ice-tongs	75
1 meat block	50
1 meat chopping knife	50
1 iron screen rake	2 50
1 large seive	1 00
1 seal and set of dies	13 12
1 tin strainer	50
1 one-gallon measure	50
1 hatchet	1 00
1 axe and helve	1 50
100 hatching boxes	25 00
1,207 wire cloth trays for ova hatching	207 51
1 fish library	30 00
1 postal balance	3 00
	$2,687 91

A REQUEST.

As it is of very great importance that the Commission keep pace with their work, and be informed as early as possible of the success or non-success of all efforts to stock the waters of the State, it is specially requested that any person who has any information concerning the fish planted in either the rivers or lakes, will forward the same to the undersigned, or what will be still better, publish the item or information in the home newspaper, and send a marked copy to the Superintendent.

GEO. H. JEROME, *Superintendent,*
Niles, Mich.

COMMISSIONERS OF FISHERIES.

United States.

PROF. SPENCER F. BAIRD.....Smithsonian Institute, Washington, D. C.

Dominion of Canada.

W. F. WHITCHER.....Ottawa.

Alabama.

CHARLES S. G. DOSTER.....Montgomery.
ROBERT TYLER.....Montgomery.
D. R. HUNDLEY.....Courtland.

California.

B. B. REDDING.....Sacramento.
S. R. THROCKMORTON.....San Francisco.
J. D. FARWELL.....San Francisco.

Connecticut.

WILLIAM M. HUDSON.....Hartford
ROBERT G. PIKE.....Middletown.
JAMES A. BILL.....Lyme.

Iowa.

B. F. SHAW.....Anamosa.
SAM. B. EVANS.....Ottumwa.
CHAS. A. HAINES.....Waterloo.

Maine.

E. M. STILWELL.....Bangor.
HENRY O. STANLEY.....Dixfield.

Maryland.

T. B. FERGUSON.....Baltimore.
P. W. DOWNES.....Denton.

Massachusetts.

THEODORE LYMAN.....Brookline.
E. A. BRACKETT.....Winchester.
ASA FRENCH.....South Braintree.

Michigan.

JOHN J. BAGLEY.....Detroit.
ANDREW J. KELLOGG.....Allegan.
GEORGE CLARK.....Ecorse.

Minnesota.

DAVID DAY.....St. Paul.
A. W. LATHAM.....Excelsior.
HORACE AUSTIN.....St. Paul.

New Hampshire.

OLIVER H. NOYES.....Henniker.
JOHN S. WADLEIGH.....Laconia.
A. C. FIFIELD.....Enfield.

New Jersey.

J. R. SHOTWELL.....Rahway.
G. A. ANDERSON.....Trenton.

New York.

HORATIO SEYMOUR.....Utica
ROBERT B. ROOSEVELT.....New York City.
EDWARD M. SMITH.....Rochester.

Ohio.

JOHN H. KLIPPART.....Columbus.
JOHN HUSSEY.....Lockland.
E. T. STERLING.....Cleveland.

Pennsylvania.

H. J. REEDER.....Easton.
B. L. HEWITT.....Holidaysburgh.
J. DUFFY.....Marietta.

Rhode Island.

NEWTON DEXTER.....Providence.
ALFRED A. REED, JR.....Providence.
JOHN H. BARDEN.....Scituate.

Vermont.

M. C. EDMUNDS.....Weston.
M. GOLDSMITH.....Rutland.

Virginia.

WILLIAM B. BALL.....Mid Lothian.
ASA WALL.....Winchester.

Wisconsin.

A. PALMER.....Boscobel.
WILLIAM WELCH.....Madison.
P. R. HOY.....Racine.