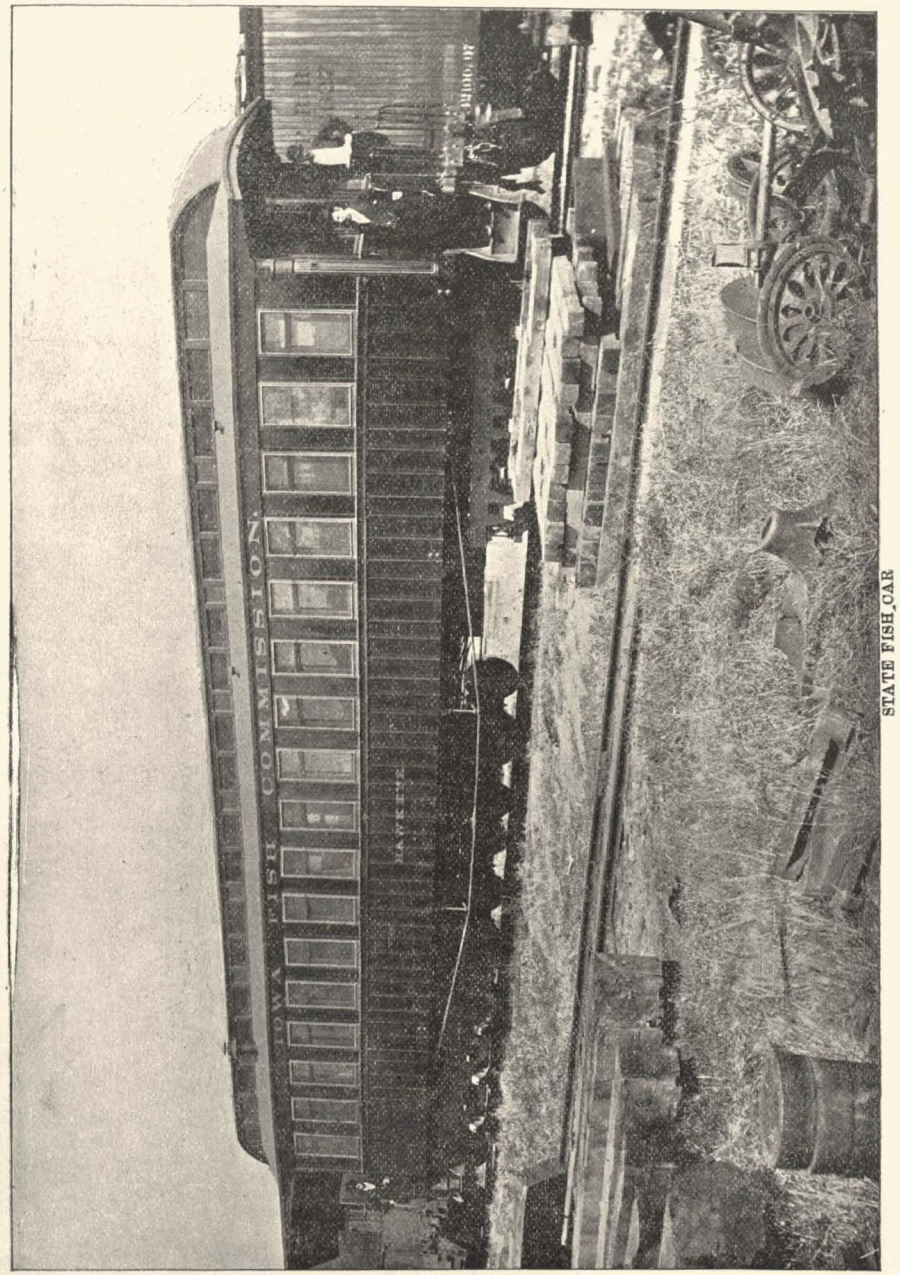

STATE FISH CAR

THIRTEENTH BIENNIAL REPORT

OF THE

State Fish and Game Warden

TO THE

GOVERNOR OF THE STATE OF IOWA.

1898--1899.

GEO. E. DELAVAN, WARDEN.

PRINTED BY ORDER OF THE GENERAL ASSEMBLY.

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REPORT.

To His Excellency, L. M. Shaw, Governor of Iowa:

DEAR SIR—In pursuance of the provision of section 2539, creating the office of fish and game warden, I submit for your consideration the thirteenth biennial report of the state fish commissioner, and the first biennial report of the game warden. During the past two years prosperity has smiled upon the work of distribution of the native food fish of the state. The species of fish taken for stocking the rivers and lakes of Iowa are the black bass, wall-eyed pike, crappie, silver bass, sunfish, and channel catfish. Although more than two million fish have been distributed, the demands on the commission are far in excess of its ability to supply, owing to the growing interest throughout the state. There is no better food than fish for both rich and poor.

The supply in the Mississippi bayous seem to be practically inexhaustible. The commission collects the best of these fish from near Sabula, where the state retaining ponds are located.

During the year 1897 the work was carried forward with difficulty by the use of only one retaining pond, which was not lined; and on account of the mud on both the bottom and the sides, handling the fish was seriously impeded. As the work advanced and the demands became more general, additional storage-room was necessary in 1898, when the two smaller ponds were constructed. One of these and a large one were planked in a substantial manner, the grounds neatly fenced, graded, and sodded, and cement walks laid down. The lots have also been beautified by the planting of ornamental trees, and altogether the place is attractive and the pride of the citizens of the beautiful little city in which it is located. The

ponds and grounds are under the supervision of Charles H. Swift, the warden's efficient deputy at that place.

It has been the aim of your warden to make the widest distribution of fish possible, and to reach those localities where the waters have not been previously stocked, but in some instances where applications have not been filled we did not consider the streams or ponds adapted for the life and health of the kind of fish to be distributed.

The retaining ponds at Sabula and the fish car are supplied with water free of charge from the famous artesian well at Sabula. No better water can be found for this purpose.

The gathering of the fish from the bayous has been done by two and three gangs of men, and with the assistance of teams and small boats the fish have been brought to the retaining ponds, This work could be augmented by the use of a launch to tow the fish boxes up and down the river. The state should own a boat of this kind, both as a means of simplifying the work and as a matter of economy.

ENFORCING THE FISH LAW, AND RECOMMENDATIONS.

The warden finds it much easier from year to year to enforce the fish and game laws of the state, especially since the stocking of our rivers and lakes by means of the car began. As the people see the increase of the fish they become interested in their preservation and render us aid in our efforts to enforce the law. Our greatest aids are the numerous fish and game protective societies which have been organized in many sections of the state, the membership of which societies is composed of enthusiastic sportsmen who frown upon the violation of the law and report to me regarding its infractions

In many instances the deputy warden system inaugurated by the Twenty-seventh General Assembly is a failure, as many of the seventy-nine deputies whom I have appointed since the passage of the law, refuse to work for nothing. The law should be changed so that a deputy could receive a part, at least, of the fine to pay him for his trouble. Few men care to incur the enmity of others if compensation is not forthcoming from some quarter. As the law now is the informant's fee is seldom paid. To escape the jail penalty the worthless poacher usually pays the fine, but does not pay the informant's fee, because he is not obliged to under the law. The law should be amended to send the poacher to jail until both fine and costs are paid, or pay

the informant half of the imposed fine when it is paid. Not until an arrangement is made to pay the deputy a reasonable amount for his services will this system become effective. In several states the deputies draw a salary. In California twelve deputies are paid $3 per day and expenses for time actually spent in the discharge of their duties. In Minnesota district deputies receive $50 per month and expenses. The result is highly satisfactory in either case.

We recommend that the law be changed so as to make the killing of fish, by an explosive, a felony. Under the present law the offense is made a misdemeanor, and the punishment does not fit the crime. We know of instances where thousands of choice small fish have been killed in this inhuman manner in order that the perpetrators might secure a few large ones.

The fish and game warden and his deputies should be given police powers while in the discharge of their duties. Under the present law the attorney-general says they have no more power than a private citizen, and are liable to prosecution if they carry concealed weapons. Section 2539 of the code says: "The warden shall faithfully and impartially enforce obedience of this chapter," and yet practically leaves him and his aids stripped of the necessary power to do so. Several embarrassing instances have arisen in this particular. In Hamilton county a deputy, appointed under authority of section 2562, arrested a hard gang of law-breakers and succeeded in convicting them. They retaliated afterwards by securing the deputy's arrest for having a revolver in his possession. The justice before whom the case was tried regretted to impose a fine, but was obliged to, under the law. After the deputy's conviction it was impossible for sometime to secure another deputy in that county, as men did not care to endanger their lives without at least having an equal chance with the desperate characters they necessarily are obliged to deal with when making arrests of seiners and dynamiters. This serious defect should be speedily remedied.

There is not any law in Iowa that prevents the buying and selling within our own state of both fish and game taken or killed in another state. During the closed season of both fish and game it is very convenient for the dealer to say that the product he has on hand in abundance was taken in some of the bordering states, when nine times out of ten the fish and birds were illegally killed in Iowa. In some states it is no defense

for a dealer to make this claim. If there were a law to this effect in Iowa it would be the means of preserving our valuable fish and game interests in a great degree. Provision should also be made that it shall be no defense for any person to claim that game or fish found in his possession was killed or caught outside of this state.

Your warden believes that the game and fish of Iowa should be preserved for the citizens of Iowa, and to that end he is in favor of the enactment of a license law that will compel the people of other states, who come here for the purpose of killing the game, to pay a fee that might be determined by the legislature. In Illinois a similar law has been enacted, and outsiders are obliged to pay a license fee of $10 in each county. North Dakota exacts a license fee of $25 for the entire state, South Dakota $10, Minnesota $25, and Wisconsin $25. Since these license laws were enacted in our neighboring states, Iowa has been hunted from one side to the other by nonresidents, principally from the states named, as there is no license fee to pay here. The counties in Iowa bordering on the Mississippi river have been greatly annoyed by hunters from Wisconsin and Illinois, who persist in coming here and killing for market game that rightfully belongs to the taxpayers of Iowa. Whenever a citizen of Iowa is detected hunting on the other side of the Mississippi he is promptly arrested and fined as the law there provides. A case was recently tried in which a citizen of Burlington was convicted and fined for killing a duck on the Illinois shore, the bird being shot on land owned by a sportsmen's club of Burlington. Thedu ck was killed for the purpose of testing the constitutionality of the law, and Judge Kohlsaat, of Chicago, has declared the law constitutional and affirmed the decision of the lower court. Our people should have the same rights and privileges extended to them in this respect that the legislatures of other states give their constituents.

The warden is also in favor of a law which will prevent fishing near a fishway, and the penalty of infraction should be severe therefor. In some of the states the fine imposed is $10 and costs for each fish so taken. In Minnesota the limit is one hundred feet. If the fish coming from a fishway are not protected, they can easily be taken in large numbers and the value of the fishway thus destroyed.

It has become apparent that the jurisdiction of the Iowa

fish law should be extended to the middle of the channel of the Mississippi river. Both Wisconsin and Illinois have laws prohibiting the seining of fish on their side of the channel, and the result is that the Iowa side of the river is seined constantly by market fishermen. The Mississippi river is the source of supply for all of Iowa's inland waters, and if the fish are allowed to be taken there without hindrance the supply for our rivers and lakes is necessarily cut short. In all the cities and towns on both sides of the river are to be found large numbers of men with miles of seines constantly draining Iowa's side of the river of fish that would ascend the interior rivers if let alone. Near the town of Sabula, on the Iowa shore, is a pretty bay in the river that is a natural place for fish to gather in. This fall in one haul of a seine in this bay by fishermen from Savannah, Ill., 800 wall-eyed pike weighing from two to five pounds were taken, besides a large number of fish of other varieties. If other states bordering on the Mississippi can prohibit this wholesale destruction of fish, Iowa can and should do it at the earliest opportunity.

Every year millions of young game fish perish in the sloughs and bayous of the Mississippi along the Iowa shore. These fish are hatched there during the time of high water, and when the water recedes in the fall they are left to die. These fish should be saved—seined out and placed in the river, and money spent in the work of rescuing such fish would be judiciously used. The importance of this work cannot be overestimated, for in one season the amount of food saved for the people would repay at least a hundred fold for the effort. The warden believes that $2,000 should be appropriated for this work for the next biennial period.

MILLDAM OWNERS MUST CONSTRUCT FISHWAYS.

In the fish commissioner's last biennial report reference was made to a case instituted by the state against Beardsley Bros., of Oskaloosa, for the purpose of forcing the construction of a fishway in their dam over the river near that city. The case was tried before Judge Dewey, who declared the Iowa law relating to fishways unconstitutional and rendered a verdict for the defendants. The state at once appealed to the supreme court, and as the case is one that affects the entire water-power interests of Iowa, the decision of the higher court recently

given, which reverses the lower court in every particular, is appended below:

STATE v. BEARDSLEY.

(Supreme Court of Iowa, May 16, 1899.)

ATTORNEYS—AUTHORITY—EVIDENCE—CONSTITUTIONAL LAW—DAMS—POLICE POWER—PRESCRIPTION—NUISANCE.

1. Code 1873, paragraph 214, which provides that the court may, on motion of either party to an action, require the attorney for an adverse party to produce or prove the authority under which he appears, and until he does so, may stay all proceedings by him in behalf of those for whom he assumes to act, provides the exclusive method of testing the authority of the attorneys.

2. An allegation in an answer setting up a lack of authority on the part of the attorneys to commence the action is an affirmative defense, and is denied by operation of law, and the action would not abate until such want of authority was proven.

3. Laws of the Seventeenth General Assembly, chapter 188, which provides that the owner or owners of any dam or obstruction across any watercourse in this state shall within a reasonable time construct and maintain over or across said dam a fishway which will afford free passage for fish up and down and through said watercourse, and that any dam not so provided within a reasonable time shall be abated as a public nuisance, is not, as to one who owns both sides of a stream, and who has maintained a dam there for twenty-three years, unconstitutional, as depriving him of his property without due process of law

4. Such act does not constitute a taking of private property for public use without just compensation.

5. The requirement by the legislature that dams across streams shall be so constructed as not to interfere with the passage of fish is a legitimate exercise of the police power of the state.

6. It is the province of the legislature, within the fundamental limitations upon its authority, to prescribe what shall constitute a nuisance.

7. By maintaining a dam for twenty years the owner does not acquire a prescriptive right as against the power of the state to compel erection of fishways.

Appeal from district court, Mahaska county, A. R. Dewey, Judge.

The defendant is the owner of about 100 acres of land, through which flows Skunk river. The defendant is now, and has been for some years, maintaining a dam across said river, on his premises, in a way to obstruct the free passage of fish up and down said river; and he has neglected, and still neglects and refuses, to construct and maintain over or across said dam a fishway for the passage up and down said river. This action is brought to have a dam adjudged a nuisance and have the same abated. The issues present several propositions, which will be noticed in the proper connection. The district court gave judgment for defendant, and the state appealed. Reversed.

Milton Remley, attorney-general, James Carroll, B. W. Preston and J. F. & W. R. Lacey, for the state; J. C. Blanchard, for appellee.

GRANGER, J.—1. The action was commenced in September, 1895, by the filing of the petition, with "Carroll, Lacey, and Preston, attorneys for plaintiff." The answer was filed October 1, 1895, and one division of it is that "the parties commencing this action have no right or authority to commence or prosecute this action, that they have no power or authority to represent the state, and that this action can only be prosecuted by the attorney-general or other proper state officers." The point is now urged in argument. It is not doubted that the state is the proper party; the controversy being as to the attorneys who first appeared for the state,—the thought being that the attorneys are the parties prosecuting. The question, it seems to us, must turn on whether the attorneys have authority to appear, as such, for the state; and whether they have such authority or not is a question of fact, for, as the averment is in the answer, in the nature of an affirmative defense or plea, it is denied by operation of law, and, before the suit could be abated for want of such authority, the fact must be made to appear, and no further attention seems to have been given the question. We must say, however, that it is doubtful if a suit could be abated, or even delayed, by such a presentation of the question of the authority of the attorneys to bring suit in the name of a party, because of a specific provision of the code of 1873, under the provisions of which this proceeding was commenced and tried. Section 214 of that code is as follows: "The court may, on motion for either party and on the showing of reasonable grounds therefor, require the attorney for the adverse party, or for any one of the several adverse parties, to produce, or prove by his own oath or otherwise, the authority under which he appears, and, until he does so, may still all proceedings by him on behalf of the parties for whom he assumes to appear." We think this statute is designed as the exclusive method of testing the authority of attorneys to appear in behalf of clients. It is also to be said that the attorney-general afterwards appeared in the case and is now of counsel for the state.

2. The following are provisions of chapter 188, laws Seventeenth General Assembly: "The owner or owners of any dam or obstruction across any river or stream, creek, pond, lake, or watercourse, in this state, shall, within a reasonable time, erect, construct, and maintain, over or across said dam or obstruction, a fishway of suitable capacity and facility to afford a free passage for fish up and down and through said watercourse when the water of said stream is running over the dam." "Any dam or obstruction mentioned in section 1 of this act, not provided with such a fishway within a reasonable time after the taking effect of this act, is hereby declared a nuisance, and may be abated accordingly." It is said by appellee that the defendant and his grantors have owned the land and maintained the dam for more than twenty-three years, and that the act above quoted is unconstitutional, in that it deprives the defendant of his property without process of law, and also because private property is taken for public use without just compensation. The question of the constitutionality of such laws is not a new one in this country. It may be conceded that the authorities on the question are not without conflict. Whether or not the law contravenes either provision of the constitution depends on whether the acquisition of rights by the purchase of the land and the erection of the dam was without a reservation by the public to legislate in respect to the preserva-

tion of fish by the passage of such a law. The rights of the riparian owner on unnavigable streams is a subject that has been much considered by the courts, and in some respects the conclusions are harmonious, such as to the use of the water, and the exclusive right to take fish from the stream on his own land; it being the law that such an owner, if owning on both sides, as title to the banks and the bed of the stream, and, if the stream is the boundary, then to the center thread of the stream. It is well-settled law that one riparian owner has not the right to so use the stream as to unreasonably deprive other riparian owners of rights common to all. It has ever been the law that riparian owners, when taking title from the public, do so with limitations in the public interests. They do not own the stream, but, by virtue of ownership of the soil, have the right to use the water passing over or through it, with limitations on such use. These limitations are to protect what have always been regarded as public rights or interests. Streams flowing through the country are not alone the heritage of riparian owners. They pass over and along our public highways, and through our cities and towns, where the general public have access to them, and have rights in relation thereto that no one would think of questioning. These rights so pertain to the public health, convenience, and comfort that the cause of their loss by personal interference would amount to a public nuisance. Fish and game are so related to the public welfare that they have, time out of mind, been the subjects of legal control, and their preservation has been very generally a matter of legislative concern. Chapter 15 of title 12 of our present code is a practical illustration of legislative thought on the subjects of fish and game,—as to the public interest therein and their utility. These laws, if enforced, are of manifest abridgment of otherwise legal rights of the owners of the soil in taking fish and game thereon, and, except perhaps as to specific details, they meet with universal approval. These considerations are valuable in considering the inherent right of the owner of the soil to so use it as to impair such a public interest. In *Com. v. Essex Co.*, 13 Gray, 247, Chief Justice Shaw used this language: "It seems to be well settled that the obstruction of the passage of the annual migratory fish through the waters and streams of the commonwealth is not an indictable offense at common law; but the right to have these fish pass up the rivers and streams, to the headwaters thereof, is a public right, and subject to regulation by the legislature." Because of the court from which it emanates, we copy an opinion by the supreme court of the United States in *Holyoke Co. v. Lyman*, 15 Wall. 500, as follows: "Rivers though not navigable even for boats or rafts, and even smaller streams of water, may be, and often are, regarded as public rights, subject to legislative control, as the means for creating power for operating mills and machinery, or as the source for furnishing a valuable supply of fish, suitable for food and sustenance. Such water-power is everywhere regarded as a public right, and fisheries of the kind, even in waters not navigable, are also so far public rights that the legislature of the state may ordain and establish regulations to prevent obstructions to the passage of the fish, and to promote the usual and uninterrupted enjoyment of the right by the riparian owners. Proprietors of the kind, if they own both banks of the watercourse, and the whole soil over which the water of the stream flows, may erect dams extending from bank to bank to

create power to operate mills and machinery, subject to certain limitations and conditions, and may also claim the exclusive right of fishery within their territorial limits, subject to such regulations as the legislature may from time to time ordain and establish. 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 power to operate mills and machinery or as a fishery, subject to the implied conditions 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."

In *Weller v. Snover*, 42 N. J., Law, 341, the same quotation was made from Chief Justice Shaw, and the case of *Holyoke Co. v. Lyman* is cited, and the syllabus states: "The state has the right, by legislation, to protect fish in rivers and streams not navigable." As early as 1808 the supreme court of Massachusetts announced the law that: "Every owner of a watermill or dam holds it on the condition, or perhaps under the limitation, that a sufficient and reasonable passageway shall be allowed for the fish. This limitation, being for the benefit of the public, is not extinguished by any inattention or neglect in compelling the owner to comply with it." *Inhabitants of Stoughton v. Baker*, 4 Mass., 522. The case of *Parker v. People*, 111 Ill., 581, is a somewhat full consideration of the question, with an elaborate dissenting opinion by one of the justices; so that the case may be said to have received careful consideration. The statute of that state is so nearly like ours as to make the case entirely applicable. In that case the unconstitutionality of the law was urged upon the same grounds as in this case. The case has a somewhat more extended quotation from *Inhabitants of Stoughton v. Baker* than we have made, and gives full sanction to the rule, upon a review of the English as well as the American authorities. In 1822, in *Hooker v. Cummings*, 20 Johns , 90, the supreme court of New York said: "The legislature have confessedly the right of regulating of fish in private rivers, and do every year pass laws for that purpose, as to rivers not navigable in any sense, and which are unquestionably private property." State of Nebraska has a like law, and the question of its constitutionality arose in *West Point Water Power & Land Imp. Co. v. State*, 49 Neb., 218,66 N. W., 6; and its validity was sustained, with a citation to the above authority and others. It should be said that the latter case, as authority, is questioned, because on rehearing the case was reversed, while on the first hearing it was affirmed. This is to be said of the case: On the hearing the case was reversed, and the law held unconstitutional, because of a noncompliance with the constitutional requirement as to what should be expressed in the title of the act, which question was not presented on the former hearing. Both opinions are published in the official report, and there is no reconsideration of the questions determined on the first hearing. We are unwilling to believe the court would permit the case to be reported as it is, had there ever been a serious doubt of the correctness of its conclusions on the first hearing; so that, whatever may be the status of the case as to the conclusiveness of the holdings, it is evidently an expression of the judgment of the court on the questions considered In this same connection we may further say that some of the cases cited—such as *Holyoke Co. v. Lyman*, *West Point Water Power & Land Imp. Co. v. State*, and others—are thought

to be without force, because the dams were across navigable streams. It is true that they were; the erection of dams being under a grant by the state, with no reservation in behalf of the public as to fishways. The law seems to be as definitely settled in favor of the public to protect fish, and provide for their passage along the streams, as well in unnavigable as in navigable waters. In both instances the power to regulate is based on public interests, and it is not easy to see wherein the public may not as well assert its reserve power for such a regulation where the title has passed to the banks and bed of the stream, without express reservation, as where there is an express grant for the construction of the dam across a stream without reservation. The limitation of rights or reservation of power arises by implication of law affecting the grant in either case. But, aside from this, the courts of the country, from its very highest, have regarded these cases as so akin in principle that, almost if not entirely without exception, their conclusions have been made to rest, in cases where the dam has been constructed or maintained by grant, upon the rules applicable as well to unnavigable streams. The cases are valuable as indicating the trend of legal thought on the subject, even if not authoritative in the way of adjudications—in which view, however, we are not disposed to concur. Were we to hold the present law unconstitutional, so as to open the way for a riparian owner whose land is on both sides of a stream, or two abutting owners, to, by a dam or other obstruction, prevent the passage of fish up the stream, and thus deprive other riparian owners and the public of privileges as ancient as civilized history, the way would be well opened for innovations and surprises as to rights long enjoyed and of undoubted security. The streams and lakes are the natural abiding places for the fish. In them they cast their spawn and multiply their species. They constitute an important and valuable article of diet for the rich and poor, and, with the ways open that nature has provided, they are accessible to both. If the lowest riparian owner of a stream may legally block the way of their migration, the consequences to result to the thousands are not readily imaginable. The law that would permit it would be the entering wedge by which the few would profit at the expense of the many. Before we sanction such a rule, its existence should clearly appear.

3. It is urged that, because of the dam being constructed thirty years before the enactment of the law, defendant has a right to maintain it by prescription. The clear weight of authority is against such a right. The cases already cited are quite decisive of this question. The strongest case we have noticed in support of appellee's claim is *Woolever v. Stewart*, 36 Ohio St., 146. It holds to the doctrine that, as between riparian owners, or the maintenance of the dam for twenty-one years, under certain conditions to make the holding adverse, a prescriptive right exists that the legislature may not disturb. The holding is made to depend clearly on a rule that there is no implied limitation upon the owner of the soil as to his right to obstruct the passage of fish along the stream, in which respect the case stands opposed to what seems to us the clear weight of authority and reason. In Maine, the supreme court, speaking to this question, said: "No individual can prescribe against this right which is held to belong to the public." *Cottrill v. Myrick*, 12 Me., 222. In *West Point Water Power & Land Imp. Co. v. State*, *supra*, it is said: "Regarding the plaintiffs in error's reliance upon a prescriptive right to maintain its dam without making provision for the passage of fish, and upon the fact that the construction of the dam was authorized by the territorial legislature, it is sufficient that the reserve powers of the state, including the right to conserve and promote the public welfare at the expense of private interests, denominated the 'police power,' is inalienable, and cannot be surrendered or bartered away by the legislature." This case involves no question of a surrender of such rights by the legislature, and we quote the language only as to its force upon such rights being lost by prescription. The authorities make the police power of the state the basis of legislative authority to prescribe regulations as to fish and its streams; and in *Stone v. Mississippi*, 101 U. S., 814, it is said that, "all agree that the legislature cannot bargain away the police power of the state." This being true, how could the legislature, beyond its power of retraction, exempt the dam owner from obligations to maintain passageways for fish, to the detriment of those conditions which it is the office of the police power of the state to conserve and protect? If this could not be, how could it be that a rule of prescription would operate to suspend such a power? It would seem that all reason, if not all authority, is against such a rule. It is thought that it is not competent for the legislature to declare the dam a nuisance, and a reason given is because it is "not a nuisance." The statement can only be of force by saying that a nuisance is legally so defined, upon other and higher authority, that the legislature may not provide that such an obstruction against the public interests shall constitute a nuisance. Our understanding is that it is the province of the legislature to prescribe what shall constitute a nuisance, within the fundamental limitations upon its authority. One definition of a nuisance is the unlawful use of one's own property, working an injury to a right of another or of the public, and producing such inconvenience, discomfort, or hurt that the law will presume a consequent damage. Woods, Nuis. 1; 16 Am. & Eng. Enc. Law, 923. The legislature has kept itself within the settled rule; for that the act of obstructing the passage of fish, against individual and public interests, would raise a legal presumption of damage is too clear a proposition to be debatable. We need not consider other questions, and the judgment will stand reversed.

Since this case was decided several owners of dams have voluntarily built fishways. Among these are the owners of the two dams at Waterloo, and of those at Cedar Falls, Waverly, Nashua, Independence, Hazelton, and Canton.

BONAPARTE DAM.

Regularly, for a number of terms of the Iowa legislature, a bill has been presented asking for $25,000 to pay the Meek Bros., of Bonaparte, for the dam across the Des Moines river at that place, that the dam might be destroyed and the fish from the Mississippi river ascend the stream without hindrance. This dam is located in Van Buren county, and is the first dam on the Des Moines river north of the Mississippi. At nearly all times of the year, but more especially in the spring, large

numbers of fish come up the river as far as this dam and can get no farther, as the dam completely obstructs their passage beyond this point. By the existence of this dam thousands of people residing on the Des Moines river north of Bonaparte are deprived of their rightful supply of fish, and they desire that a fishway be placed in the dam. At the request of a large number of these people a suit was begun against the owners of this dam (after the above sweeping decision of the supreme court) to compel them to construct a fishway. The case was tried at Bloomfield December 19, 1899, judgment being rendered for defendants. The state has appealed.

IN REGARD TO TRAPPING AND KILLING GAME BIRDS.

The last two years have been excellent for hunting feathered game. Both prairie chickens and quail have been found quite plentiful, but considerable poaching has been done in localities where public sentiment is against the enforcement of the law.

Prior to 1898 no person was especially empowered to look after the preservation of the valuable game interests of the state, and in some of the western counties trapping and shipping had been engaged in regularly every winter. On one farm in Monona county your warden seized 180 chicken traps, and 138 chickens were seized at Cherokee enroute for Boston. The traps were destroyed and the poacher punished. The warden also seized half a dozen chicken traps near New Hampton with which the owner said he had been trying to catch crows. The feathers in the traps resembling prairie chicken feathers, the traps were legally destroyed. In Clay county winter prairie chicken poachers array themselves in white suits of clothes when hunting. On a bright day when the snow is on the ground the poacher can work himself slowly but surely close enough to a flock to cause fearful havoc with his repeating Winchester before the birds can get out of range. Three prairie chickens taken from the person of one poacher who was hunting in this manner, cost him about $70.

Under the protection of the law passed by the legislature six years ago, quail have increased so that it was not unusual last fall to find flocks of from twenty to thirty birds. The last legislature, however, changed the open season on quail to November 1st to December 31st. This was a mistake, for as soon as the snow came the birds could be easily tracked and killed in large numbers by the market and pot hunters. If the

law is not changed, making the open season from October 1st to November 30th, there will soon not be any quail to protect. Woodcock and partridge have become very scarce.

If the fashion of decorating bonnets and hats with the stuffed skins of song birds could be abandoned, the lives of thousands of Iowa's bright-plumaged birds would be saved. Several species of these beautiful birds have become nearly extinct on account of the quite general slaughter of them for that purpose.

GLUCOSE CASE.

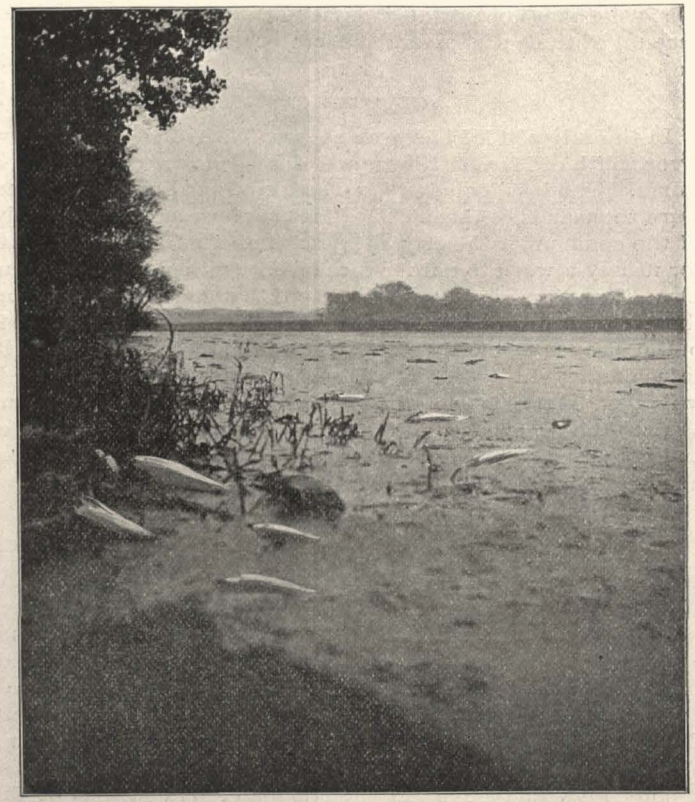
In the fall of 1897 large numbers of fish died in the Iowa river south of Marshalltown, and floated down to the city of Tama. The loss included fish of all kinds and sizes, and there were thousands of them. As a means of protecting the health of the community the city authorities of Tama employed men for nearly a week to gather these fish together and bury them. Upon investigation as to the cause of this general destruction, the fact was ascertained that the waters in the river had been polluted by the glucose factory of Marshalltown depositing its refuse matter in the river. After an analysis of the water, in which certain acids were discovered, proceedings were begun against the proprietors of the works and they were convicted and heavily fined. This was the second offense. The case has been appealed.

THE FISH CAR AN EDUCATOR.

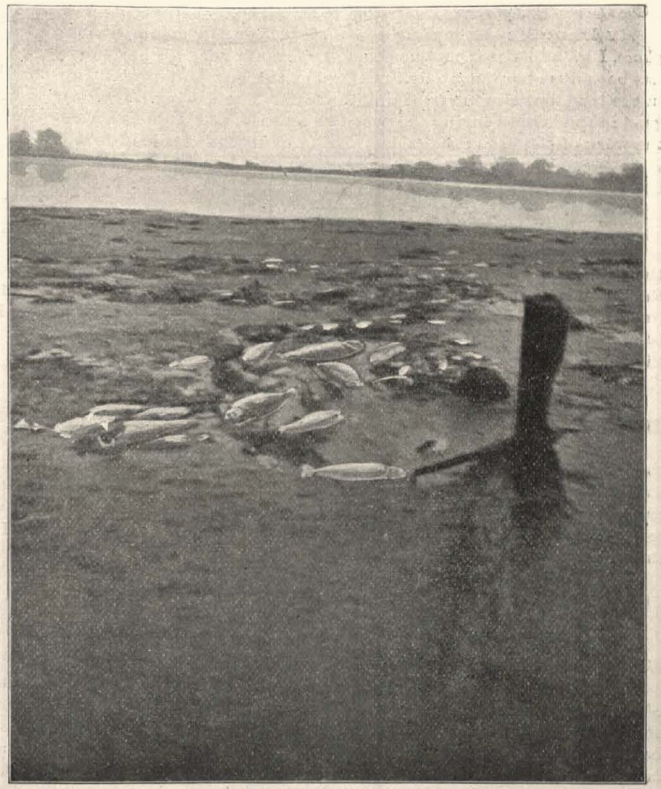
The warden finds that the fish car creates a healthy sentiment in favor of the enforcement of the law relating to the protection of fish. Wherever a load of fish is deposited, the people at once take measures to secure their protection, and either a deputy is at once appointed or a rod club is organized. In this manner of distribution the people become interested in the work of preservation and greatly aid us in our efforts at enforcement. There is no way in which the commission can increase the supply of both fish and game in the state except by the exercise of constant vigilance in the detection and punishment of the lawless element.

BENEFITS DERIVED FROM STOCKING THE INLAND WATERS OF THE STATE.

Desiring to ascertain what the result has been from stocking the lakes and rivers of the state by means of the fish car



The above illustration shows thousands of dead fish floating down stream the next day after the contents of the vats were emptied in the river.



Dead fish piled up at Tama City.

during 1897, the warden last July addressed a letter to some person residing in the locality where the fish had been taken, asking if any benefit was apparent from the depositing of the fish. The following answers were received:

STORM LAKE, Iowa, August 19, 1899.

Hon. George E. Delavan, Estherville, Iowa:

MY DEAR SIR—Regarding the work of the fish commissioner at this place, I wish to state that our people appreciate very highly the work that has been done here, not only in enforcing the law and protecting the fish in the lake, but also in restocking the lake. The fishing has never been so good in the lake as during the past two seasons, and this is chiefly due to the work of the fish commission. Bring us another carload is all we ask.

Yours very truly,

F. F. FAVILLE.

WATERLOO, July 20, 1899.

The oldest inhabitant cannot remember when fish were so plentiful in the Cedar River as now. The water is alive with them. In eddies where the fish rest after a battle with the swift current, they can be seen by the hundreds. The upper dam will prove an effectual barrier, however, and it is expected that large catches will be made between the two dams when the river clears up.—Correspondent of the Dubuque Globe.

MANCHESTER, Iowa, August 31, 1899.

Hon. G. E. Delavan, Estherville, Iowa:

SIR—Your kind letter of July 12th came to hand in due time. I know the stocking of the Maquoketa river at this place has done much good. The crappie, a fish we never caught here before, are being caught, and the river is full of young ones from one to two and one-half inches long. A few pickerel have been caught, but few compared with the crappie. Let the good work go on is the verdict of all in this part of the state.

Yours truly,

GEORGE W. STORY.

GREENE, Iowa, October 28, 1899.

G. E. Delavan, State Fish and Game Warden, Estherville, Iowa:

DEAR SIR—Your letter of inquiry is before me. The fishing in the Shell Rock river at this place has not been as good for years as it has been since you gave us the carload of fish. The catch has principally been black bass and pike, both excellent fish in every particular. I think you are doing a grand work with the small appropriation you have, which should be doubled, at least, by the next legislature.

With best wishes,

G. M. TYLER.

RICEVILLE, Iowa, August 28, 1899.

Hon. George E. Delavan, Estherville, Iowa:

I presume you are anxious to know if any good came from the planting of fish in the Wapsie river at this place. Yes, the fishing has been materially benefited. We are now catching fish of all the different varieties planted, which is appreciated by our people, who are grateful for your kind offices.

R. T. ST. JOHN.

OSAGE, Iowa, September 23, 1899.

Hon. George E. Delavan, Fish Commissioner, Estherville, Iowa:

DEAR SIR—Yours of July 12th is unanswered because I wanted to have a more definite knowledge of just how much benefit we derived from the fish you put into the Cedar river. We had no crappies or Oswego bass before your fish were put into the river, or channel catfish. Last week two Oswego bass were caught that weighed three and a half and four pounds each, one channel cat weighing two pounds, and six crappies—all captured by one man. The black bass and pickerel we can't tell much about. This we know to a certainty, that the best fishing is in the Osage electric light pond. Before you placed the fish in it this pond was the poorest one on the Cedar river in the county. There are four other mill ponds in the county in the Cedar river. The state can in no other way spend money to do as much good to the people as by granting ample appropriations to the state fish commission. We are only beginning to reap the benefits of your work. We would like another car of fish as soon as it is our turn, but do not wish to be greedy in the matter.

Yours truly,

A. C. TUPPER.

FORT DODGE, Iowa, October 23, 1899.

Mr. George E. Delavan:

DEAR SIR—We have had more fish and better fishing in the Des Moines river this year than for many seasons back. The fish laws are better observed than ever, and while we have not been able to stop all illegitimate fishing, yet we have prevented the most of it, and the sentiment of the community is steadily growing in favor of the observance of the law, and violators receive no sympathy as in times past.

Respectfully yours,

LISLE BURNAM.

COON RAPIDS, Iowa, July 17, 1899.

Hon. George E. Delavan, Estherville, Iowa:

DEAR SIR—To your letter in regard to the fishing in Coon river since the fish were put in by you last year, I will say that so far as I can learn the fishing has been very poor, due no doubt to the high water. We hope for good results from the car of fish, but so far we see nothing of them.

Yours very truly,

WARREN GARST.

CEDAR FALLS, Iowa, July 14, 1899.

George E. Delavan:

Yours at hand. The water in the river thus far this season has been so high and roily that a fair test of your question has not been had, but from what has been tried the stocking of the river by the car of fish you put in

has been of decided benefit, for the river above the dam had been nearly fished out, and as the fish could not get above the Waterloo dam or the one in the river at this place, we would have had no fish had it not been for those you put in last fall. Would say yes to your question. Give us another carload. Yours, etc,

W. H. HURD.

FISHING IN SPIRIT LAKE.

On July 10, 1898, I caught sixty-seven wall-eyed pike before 10 o'clock A. M. One evening the fish did not bite very well, so I sank my three buckets of dead minnows, left my anchor out all night, with my cushion to the other end to mark the place. Next morning about 4 o'clock I went back, and I began from the very first to draw the pike out. I weighed my string of fish at noon in the presence of my wife and sister-in-law. It weighed 171 pounds. This is no fish story, for I am a preacher.

REV. E. J. BULGEN, L. D.

ARRESTS AND CONVICTIONS.

During the past two years there have been 482 arrests and convictions for violation of the fish and game laws of the state, and the fines paid in to the several county treasuries amounted to $5,627. In some localities the poachers preferred to go to jail rather than pay the imposed fines.

THE FISH CAR.

The repairs on the fish car, "Hawkeye," have been small during the three years in which it has been in operation; $100 probably would cover all the expense. During the present year, however, some more substantial repairs will be necessary. The total mileage made by the car during the past two seasons was about 14,000 miles. The warden has operated the car with only two assistants, a cook and one helper. Five men are usually employed on these cars.

TRANSPLANTING ADULT FISH.

We desire to refer to the work of transplanting the adult fish to inland waters. In the first place, the fish thus transferred by this commission are sufficiently large to protect themselves. In the second place, they are protected by the law

from November 1st to May 15th, during which time they will have spawned and replenished the waters in which they have been deposited a hundred fold. After this important event they are ready to be taken by the hook.

The demand upon this commission for fish has been so great that we are of the opinion that if the car ran every month of the year it would be impossible to grant all the requests.

ACKNOWLEDGMENTS.

We have received substantial aid from a few of the railways of the state, prominent among which are the Burlington, Cedar Rapids & Northern, the Chicago, Milwaukee & St. Paul, the Chicago, Burlington & Quincy and the Iowa Central. These companies have given the state fish car free transportation ever their lines, which proved a saving of hundreds of dollars to the state. To the above companies we are under especial obligations.

The press of the state has greatly aided us in our work by upholding the law at all times, thus creating a sentiment for the right and calling the attention of the people to the valuable work being done by the commission.

We desire to thank the members of the legislature for the substantial and courteous treatment this branch of the state's institutions has received at their hands in the past, which included the enactment of wise laws for our guidance and the granting of a larger appropriation by $3,000 than was ever granted before in the history of the commission.

DISTRIBUTION.

OKOBOJI.

Lake trout	120,000	Wall-eyed pike	10,000
Black bass	250,000	Rock bass	10,000
Crappies	175,000	Pickerel	10,000
Silver bass	50,000	Perch	25,000

SPIRIT LAKE.

Lake trout	120,000	Wall-eyed pike	25,000
Black bass	100,000	Rock bass	20,000
Crappies	125,000	Perch	10,000
Silver bass	50,000	Mixed varieties	25,000

BEED'S LAKE.

Black bass, crappies, sunfish and pickerel	100,000

CLEAR LAKE.

Lake trout	112,000
Black bass, silver bass, crappies and sunfish	250,000

STORM LAKE.

Lake trout	112,000
Black bass, silver bass, crappies and sunfish	250,000

LOST ISLAND LAKE.

Lake trout	10,000
Black bass, crappies, pickerel and sunfish	125,000

WALL LAKE.

Black bass, crappies, pickerel and sunfish	125,000

MEDIUM LAKE.

Black bass, crappies, sunfish and pickerel	125,000

CRYSTAL LAKE.

Black bass, crappies, sunfish, channel catfish and pickerel	125,000

"Q" RESERVOIR AT OSCEOLA.

Black bass, crappies, sunfish and pickerel	125,000

CEDAR RIVER.

Black bass, crappies, wall-eyed pike, perch and sunfish	370,000

DES MOINES RIVER.

Black bass, silver bass, crappies and sunfish	135,000

ROCK CREEK.

Black bass, crappies and silver bass	5,000

SHELL ROCK RIVER.

Black bass, crappies, sunfish and wall-eyed pike	125,000

RACCOON RIVER.

Black bass, pickerel, perch and sunfish	125,000

MAQUOKETA RIVER.

Black bass, crappies, catfish and perch	250,000

IOWA RIVER.

Black bass, crappies, sunfish and pickerel	200,000

TURKEY RIVER.

Black bass, crappies, sunfish and pickerel	125,000
Lake trout	60,000

CARP DISTRIBUTION.

Herman Rietveld	Pella	August Doje	Creston
H. J. Amandson	Roland	L. J. White	Marengo
C. M. Thomas	Searsboro	Isaac Porter	Prairie City
Theo. A. Anderson	Stanton	L. O. Imus	Mt. Ayr
Wm. Hartman	Whitten	F. M. Ford	Bagley
W. Lake	Cottage	Jas. P. Reilly	Montezuma
H. C. Baughman	Anita	C. L. Halcomb	Anamosa
L. P. Woods	Clarinda	Dr. H. Fischer	Pomeroy
A. S. White	Wesley	Matthew Templeton	Riceville
J. J. Hetlington	Menlo	J. A. Bennett	New Sharon
B. G. Beal	Mt. Ayr	L. J. White	Ladora
J. L. Boyer	Indianola	J. C. Caudle	New Sharon
John Bridger	Essex	Fd. Williams	Humeston
O. O. Fosse	Ruthven	G. Waterhouse	Farley
John Orr	Thornburg	C. Antenrieth	Creston
B. J. Sheppard	Caledonia	Burl G. Sheppard	Caledonia

GOLDFISH DISTRIBUTION.

Mrs. Lou Rummel	Dows	D. Chisden	Orleans
Dr. E. P. Perkins	Des Moines	E Mills	Orleans
Senator Wm. McArthur	Burlington	Minnie Cron	Orleans
Mrs. Maynett	Grinnell	A. B Palmer	Orleans
Mrs. Ella Robinson	Grinnell	Mrs. Brandon	Spirit Lake
Jas. L. Pitkin	Viola	Bertha Ankeny	Emmetsburg
Olive G. Reeve	Holstein	Maud Hudson	Estherville
Hon. G. W. Dickins	Hedrick	Mrs. Endersby	Estherville
C. E. Mann	Mason City	Rec. Stanberry	Mason City
W. B. Swafford	Hull	C. H. Slocum	Orient
Mrs. L. Du Bois	Ute	P. D. Wine	Aurelia
C. M. Manville	Ocheyedan	Chas. Seney	Mason City
Gov F. D. Jackson	Des Moines	Mrs. Wm. Shreeve	Estherville
J. F. Johannes	Sibley	Mrs. T. A. Wilson	Buffalo Center
C. F. Fowler	Waterloo	E. A. Bundy	Aurelia
A. L. Bush	Emmetsburg	Fleming Evans	Dows
Homer Atwood	Estherville	J. S. Gordon	Mason City
J. C. Watson	Inwood	M. C. Norden	Hartley
John Hammond	McGregor	J. M Womeldorf	Hartley
A. J. White	Esthervile	Mrs. Francis Peo	Morrison
A. M. Noblett	Fort Dodge	Mrs. P. R. Faragher	Sibley
J. B. Rendall	Ledyard	Lucy A. Clock	Hampton
Mrs. A. B. Lewis	Chester	Mrs. E. DeLong	Dows
Mrs. Wm. Francis	Cedar Rapids	Mrs. J. A. Landis	Greene
Conductor Mattison	Cedar Rapids	Mrs. J. S. Meade	Newell
Prof. White	Estherville	Mrs. J. M. Tregilgus	Sibley
Alva Barnes	Lovilia	C. H. Brown	Martelle
W. E. Knight	Estherville	Miss Jessie Smith	Laurens
Dr. C. C. Galloway	Estherville	C. F. Fowler (2d request)	Waterloo
Prof. S H. Adams	Bloomfield	H. M. Dayton	Colo

C. W. Cooledge	Grundy Center
B, C. R. & N. agent	Spirit Lake
W. T. R. Humphrey	Clarion
A. H. Male	Mason City
B. Van Vliet	Mason City
Mrs. McDaniel	Des Moines
Fannie Shaffer	Des Moines
Mr. Grout	Estherville
T. G. Crozier	Cedar Rapids
H. C. Kendall	Emmetsburg
Mrs. W. H. Parkin	West Bend
J. A. Smith	Spirit Lake
Mrs. G. M. Stober	West Liberty
Susan Day	Russell
Mrs. C. Van Saunders	Emmetsburg
Mrs. J. S. Mead	Newell
Mrs. Mary Narey	Spirit Lake
Hon. John Herriott	Des Moines
W. M. Smith	Sheldon
S. H. Smith	Sheldon
Mrs. G. J. Stewart	Chariton
Mrs. B. P. Birdsall	Clarion
J. W. Todd	Sanborn
Olaf Olson	Rock Rapids
W. D. Jenkin	Rock Rapids
J. L. Moffit	Wapello
Mrs. Dr. Anderson	Estherville
Graaf & Fletcher	Estherville
Art Bradley	Estherville
John Godden	Estherville
A. J. White	Estherville
G. W. Coburn	Sibley
W. H. Read	Cumberland
J. C. Van Slyke	Cumberland
Mrs. Emma B. Swain	Sibley
Fred Roberts	Estherville
Dr. Perkins (2d request)	Des Moines
Mrs. D. P. Greeley	Red Oak
Mrs. George H. Vaugh	Emmetsburg
W. A. Dowell	Cumberland
Mabel Youngerman	Maple Hill
Miss Alice Fox	New Sharon
Mrs. H. E. Francisco	Mason City
Senator W. F. Ellison	Anamosa
Mrs. J. B. Jewell	Estherville
D. H. Adams	Estherville
Theron Morgan	Gurnsey
Harriet Williams	Dows
J. A. Trunk	Dows
Mrs. H. C. Nebb	Sibley
Mrs. C. Humphrey	Grand Junction
A. W. Nemseek	Emmetsburg
Hon. Thos. Lambert	Sabula
J. S. Nye	Primghar
Mrs. John Barnhart	Estherville
Mrs. DeWitt Clinton	Mason City
Mrs F. L. Stoddard	Carroll
D. H. Cross	Mason City
Mrs. Will Bigby	Shellsburg
J. A. Bennett	New Sharon
Fred W. Mack	Newell
Alva Barnes	Lovilia
W. T. R. Humphrey	Clarion
H. C. Kendall	Emmetsburg

ESTIMATE OF FUNDS NECESSARY FOR 1900-1.

For gathering fish at Sabula for restocking the rivers and lakes of the state	$ 4,000
For protection, distribution and reproducing fish for the next two years	5,000
Payment of deputy fish and game wardens	3,000
For purchase of electric or gasoline launch	500
Assistant's salary	500
Payment of railway transportation for the fish car	2,000

I desire to call your attention to the fact that the amount is one-half as large as the Minnesota fish and game commission was granted last year, and about one-third as large as the amount the Wisconsin fish and game commission was voted by the last legislature of that state.

STATEMENT OF RECEIPTS AND EXPENDITURES.

The last biennial report gave an exhibit of receipts and expenditures from April, 1896, to April 1, 1898. At that time there was an unexpended balance, of the $6,000 appropriated, of $726.48, which was the only available resource the commission had for carrying the work forward for five months, from October, 1897, to April, 1898. At the present time, December 5th, there is an unexpended balance of the appropriation made by the last legislature of $2,275.53, which will be used in the work until next April.

	EXPENDITURES.	RECEIPTS.
Amount appropriated by the Twenty-seventh General Assembly		$ 9,000.00
April, 1898	$ 1,109.30	
May, 1898	293.17	
June, 1898	414.30	
July, 1898	100.15	
August, 1898	170.52	
September, 1898	401.07	
October, 1898	605.68	
November, 1898	431.31	
December, 1898	166.46	
January, 1899	143.01	
February, 1899	88.08	
March, 1899	196.89	
April, 1899	188.18	
May, 1899	211.16	
June, 1899	212.48	
July, 1899	219.07	
August, 1899	246.73	
September, 1899	352.40	
October, 1899	728.57	
November, 1899	445.94	$ 6,724.47
Balance		$ 2,275.53

An itemized report is filed with the auditor of state.

Respectfully submitted,

G. E. DELAVAN,
Warden.

LIST OF FISH COMMISSIONERS.

U. S. COMMISSION OF FISH AND FISHERIES, WASHINGTON, D. C.

Commissioner, Geo. M. Bowers.
Chief Clerk, Irving H. Dunlap.
Assistant in charge of Division of Inquiry, respecting food fishes, Hugh M. Smith, M. D.
Assistant in charge of Division of Fish Culture, W. deC. Ravenel.
Assistant in charge of Division of Statistics and methods of the Fisheries, Chas. H. Townsend.
Disbursing Agent, W. P. Titcomb.

ALABAMA.

Col. D. Hudley, Madison.
Chas. S. G. Doster, Prattville.

ARKANSAS.

W. B. Worthen, Little Rock.

CALIFORNIA.

Alex. T. Vogelsang, president, San Francisco.
Charles B. Gould, Oakland.
J. M. Morrison, Sacramento.

COLORADO.

I. S. Swan, Denver.

CONNECTICUT.

Abbott C. Collins, Hartford.
Dr. G. H. Knight, Lakeville.
J. A. Hill, Lyme (Bill Hill P. O.).

FLORIDA.

John Y. Detwiler, New Smyrna.
John G. Ruge, Appalachicola.

ILLINOIS.

Natt H. Cohen, Urbana.
Aug. Lenke, Chicago.
S. P. Bartlett, Quincy.

INDIANA.

Zac Sweeny, Columbus.

KANSAS.

Dr. J. W. Shultz, Wichita.

MAINE.

L. T. Carleton, Augusta.
Charles E. Oak, Caribou.
Henry O. Stanley, Dixfield.

MARYLAND.

J. E. Tawes, East Shore, Crisfield.
A. T. George, Baltimore.

MASSACHUSETTS.

E. A. Brackett, Winchester.
E. D. Buffington, Worcester.
I. C. Young, Wellfleet.

MICHIGAN.

Herschel Whittaker, Pres., Detroit.
F. B. Dickerson, Detroit.
George D. Mussey, Detroit.
C. S. Osborn, Sault Ste Marie.
H. W. Davis, Grand Rapids.
A. Ives, Jr., Detroit.
Seymont Bower, Detroit.

MINNESOTA.

W. S. Timberlake, St. Paul.
F. Von Baumbach, Alexandria.
C. S. Benson, St. Cloud.
William Bird, Fairmount.
S. F. Fullerton, Duluth.

MISSOURI.

A. J. D. Berford, state game and fish warden, Berfordville.
William L. May, Fremont.
Robert S. Oberfielder, Sydney.

NEW HAMPSHIRE.

N. Wentworth, Hudson Center.
F. L. Hughes, Ashland.
W. H. Shurtleff, Lancaster.

NEW JERSEY.

George Pfeiffer, Jr., Camden.
P. N. Paige, Summit.
H. P. Frothingham, Mt. Arlington.
George L. Smith, Newark.

NEW YORK.

Barnett H. Davis, Palmyra.
William R. Weed, Pottstown.
Edward Thompson, Newport, L. I.
Hendrix S. Holden, Syracuse.
Charles H. Babcock, Rochester.

OHIO.

George Falloon, president, Athens.
J. W. Owens, Newark.
A. J. Hazlet, Bucyrus.
Albert Brewer, Tiffin.
J. C. Burnett, Sabina.

OREGON.

H. D. McGuire, Portland.

PENNSYLVANIA.

T. B. Stillwell, president, Scranton.
James A. Dale, York.
D. P. Corwin, Sec'y, Pittsburg.
H. C. Demuth, Lancaster.
Louis Streuber, Erie.
James W. Correll, Easton.

PENNSYLVANIA GAME COMMISSION.

Coleman K. Sober, Lewisburg.
E. B. Westfall, Williamsport.
I. A. Stearns, Wilkesbarre.
Wm. M. Kennedy, Allegheny City.
James H. Worden, Harrisburg.
Charles Haebner, Philadelphia.

RHODE ISLAND.

Wm. K. Southwick, Newport.
H. T. Root, Providence.
A. D. Roberts, Woonsocket.
Wm. P. Morton, Olneyville.
C. W. Willard, Westerly.

SOUTH CAROLINA.

A. W. Jones, Beaufort.

UTAH.

John Sharp, warden, Salt Lake City.

VERMONT.

John W. Titcomb, St. Johnsbury. Horace W. Bailey, Newbury.

VIRGINIA.

Dr. Frank Fletcher, Jenkins Bridge. Seth T. Miller, Hicks Wharf.
George B. Keezell, Keezellton. J. A. Curtis, Richmond.
Pembroke Pettit, Palmyra.

WASHINGTON.

A. C. Little, Tacoma.

ARIZONA TERRITORY.

Ed. Schwartz, Phœnix.

FOOD FISHES OF IOWA.

BY THE HON. TARLETON H. BEAN, OF THE U. S. FISH COMMISSION AND SMITHSONIAN INSTITUTE.

THE GREAT CATFISH.

This is the great fork-tailed cat, Mississippi cat, Florida cat, flannelmouth cat, and great blue cat of various writers. It is also called mud cat in the St. John's river, Florida. The species is very variable, as we would expect from its wide distribution. In 1879 Prof. Spencer F. Baird received from Dr. Steedman, of St. Louis, a Mississippi river catfish weighing 150 pounds, and measuring five feet in length. The writer described this fish as a new species related to the great black catfish of the Mississippi valley, *Amiurus nigricans*. At the present time it is somewhat doubtful whether or not this is merely an overgrown individual of the species under consideration, and the matter must remain in doubt until smaller examples of *Amiurus ponderosus* have been obtained.

The great fork-tailed cat is a native of the Great Lakes and the Ohio and Mississippi valleys, and in the southern states its range extends southward to Florida; northward it ranges to Ontario. This catfish reaches a weight of 100 pounds or upward, and if it includes the giant form above referred to, we may place the maximum weight at over 150 pounds. Dr. Steedman was informed by an old fisherman that the heaviest one he had ever seen weighed 198 pounds, but it is doubtful if such large individuals are to be taken at the present time. In Lake Erie this species usually weighs from five to fifteen pounds, and the largest specimens reach forty pounds.

The habits of this fish are presumably about the same as in other species of the family. On account of the great size of the fish it naturally prefers lakes and large rivers. It is a bottom feeder and will take most any kind of bait. This species is wonderfully tenacious of life. It spawns in the spring and protects its young, which follow the parent fish in great schools. Dr. Theodore Gill has reviewed the subject of the catfish's care of their young in *Forest and Stream* of November 27, 1890.

This is a valued food species, although not a choice fish. In Lake Erie, according to the review of the fisheries of the Great Lakes recently published by the United States fish commission, the catfish rank next to whitefish in number of pounds taken.

THE SPOTTED CATFISH.

This species is variously styled the channel cat, white cat, silver cat, blue cat and spotted cat. It is found over a vast extent of country, comprising the Mississippi and Ohio valleys and the Great Lake region. In the eastern states it is absent from streams tributary to the Atlantic, but occurs from Vermont southward to Georgia, westward to Montana and southwestward to Mexico. The adults of this species are bluish-silvery and the young are spotted with olive. It is one of the handsomest of the family of catfishes, and an excellent food fish. Its introduction into waters in which it is not native has begun and the multiplication of the species is greatly to be desired.

The spotted cat grows to a length of three feet and a weight of twenty-five pounds. It is extremely variable in color and in number of fin rays, and has consequently been described under more than twenty different names. It is most abundant in large, clear streams. This species is less hardy than most of the other catfish.

THE CHANNEL CATFISH.

This is the white cat or channel cat, in Philadelphia distinguished as the Schuylkill cat.

The channel cat ranges from Pennsylvania to North Carolina, and is one of the most abundant of its family in the Potomac river. It is abundant in the Susquehanna and common in the Schuylkill.

This species reaches a length of two feet and a weight of five pounds. It is extremely variable with age. Old examples have the mouth so much wider than the young that they have been described as a distinct species. The big-mouthed cat of Cope is now considered to be the old form of the white cat. The habits of this species agree with those of other species already mentioned. The name channel cat suggests a favorite haunt of the fish. As a food fish it is highly prized.

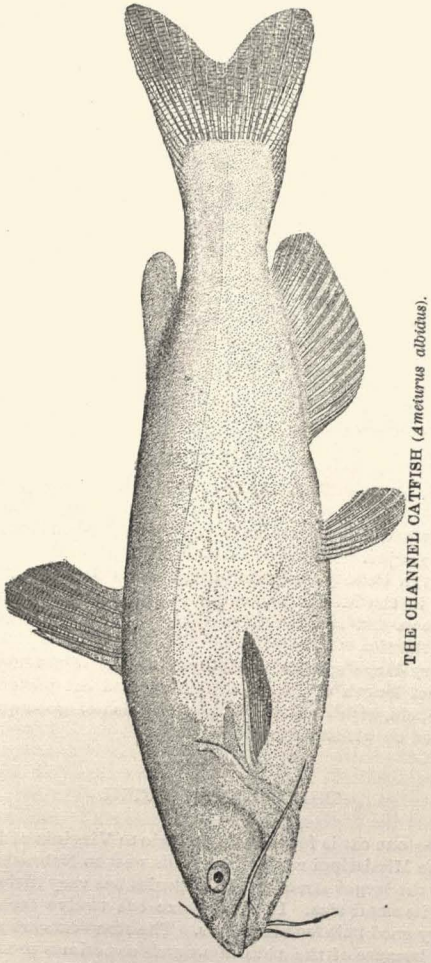
THE YELLOW CATFISH.

The yellow cat or chubby cat is found from the Great Lakes to Virginia and Texas. The species is not credited to the region east of the Alleghenies.

The length of the yellow sometimes reaches two feet, but averages much less. Nothing special is recorded about the habits of this species. It is most abundant in sluggish streams.

THE LONG-JAWED CATFISH.

The long-jawed catfish is found in the Great Lake region and westward to Manitoba. It is believed to be very nearly related to the common catfish, *A. nebulosus*, but its projecting lower jaw will serve to distinguish it.



THE CHANNEL CATFISH (*Ameiurus albidus*).

This character, however, we know by experience is not so satisfactory as it might be.

This catfish is occasionally taken in the Ohio river, but is more abundant in Lake Erie. The species reaches a length of eighteen inches and a weight of four pounds.

THE COMMON CATFISH.

This is known as the common catfish, bull-head, horn-pout, bull-pout and minister. This species has a wider distribution than the white cat, its range including New England and southward to South Carolina, west to Wisconsin and southwest to Texas.

From Jordan's Manual of the Vertebrates I quote Thoreau's account of the habits of this species: "The horned pout are dull and blundering fellows, fond of the mud, and growing best in weedy ponds and rivers without current. They stay near the bottom, moving slowly about with their barbels widely spread, watching for anything eatable. They will take any kind of bait, from an angle worm to a piece of tomato can without coquetry, and they seldom fail to swallow the hook. They are very tenacious of life, opening and shutting their mouths for half an hour after their heads have been cut off." They spawn in the spring, and the old fishes lead the young in great schools near the shore, seemingly caring for them as the hen for her chickens.

THE MUD CATFISH.

This is known under the name of mud cat, flat-head cat, Russian cat, yellow cat and goujon.

The mud cat in Pennsylvania is limited to the Ohio and its tributaries. It is abundant in the Mississippi valley in deep, sluggish waters, ranging westward to Iowa and southward to Georgia, but it is not found in tributaries to the Atlantic.

This is a very large species, reaching a weight of seventy-five pounds, and a maximum length of three feet. The mud cat prefers muddy bottoms and large, sluggish streams. It is a food fish of good qualities and is extensively used notwithstanding its ugliness.

THE STONE CATFISH.

The yellow-stone cat is found from Ontario to Virginia and in the Ohio valley. In the Mississippi region it extends west to Nebraska.

It inhabits the larger streams. The species has very little value as food on account of its small size. It seldom exceeds twelve inches in length, but it is a very good bait for black bass. The stone cats are much dreaded by fishermen because of the painful wounds sometimes produced by their pectoral spines. There is a minute pore in the axil of the pectoral which is the outlet of a noxious liquid secreted by a poison gland. When this poison is discharged into a wound it causes a very painful sore.

THE RED-MOUTHED BUFFALO FISH.

The red-mouthed buffalo fish, also known as the brown buffalo, high-backed buffalo, small-mouthed buffalo, sucker-mouthed buffalo and buffalo fish, is a common inhabitant of the Mississippi and Ohio valleys, but does not occur east of the Alleghenies.

This species reaches a length of two and one-half feet and a weight of fifteen pounds. It frequents large streams. Professor Forbes has been informed by fishermen that one or more species of buffalo fish have the "peculiar habit of whirling around in shallow water or plowing steadily along, with their heads buried in the mud and their tails occasionally showing above the surface. These operations have nothing to do with spawning, and it is likely that fishes thus engaged are burrowing for small mollusks and for mud-inhabiting larvæ." The food of this buffalo fish consists of aquatic plants, in the Illinois river chiefly duck weed and *ceratophyllum*. The animal food includes mollusks, insects and their larvæ and crustaceans. Worms are rarely found in their stomachs. The buffalo is not a choice fish and its flesh is filled with innumerable small bones, yet it is abundant and is eaten in very large quantities. These fish do not take the hook and are usually caught in seines.

THE QUILL BACK.

This is called the carp sucker, silver carp sucker, quill-back, skim-back, spear-fish, sail-fish and carp. As now limited, its range is stated to be from Pennsylvania to Virginia, and its center of abundance the region about Chesapeake Bay. Professor Cope also recognized it as occurring in the Allegheny river and generally throughout the Ohio valley.

The best account of the food of this fish is given by Prof. S. A. Forbes, who records the fish from the large rivers of Illinois and their principal tributaries, and from Lake Michigan and small lakes of northern Illinois. He found it abundant in the lakes and ponds of the river bottoms, and less common than other species of the carp suckers in running water. The species consumes less vegetation than the other fishes of its genus, and more mud is mingled with its food. It devours fewer of the large insect larvæ, and no pond snails.

"Mollusks made about one-fourth of the food—all the thin-shelled *Sphærium*. Insects averaged about one-third, and *Entomostraca* made nearly one-fourth." No worms or polyzoans were observed, but occasionally protozoa were noticed. This species reaches a length of one foot.

THE BLACK HORSE.

This is known as the black horse, Missouri sucker, gourd-seed sucker and suckerel. It inhabits the Mississippi valley, and is not uncommon in the Ohio river.

The black horse reaches a length of two and one-half feet and a maximum weight of fifteen pounds. It is the best food fish of the sucker family.

The sexes differ in color; the males have the upper part jet black while the sides are black with coppery luster. The females are olivaceous with coppery shadings. The male has minute tubercles on the snout in the breeding season in spring. Dr. Kirtland noted a migration down stream at the approach of winter. The mouth of this sucker is small and the lips are covered with numerous tubercles.

THE COMMON SUCKER.

The common sucker, also known as the pale sucker, white sucker, grey sucker and brook sucker, styled by the Canadian French the carpe blanche, is the commonest member of its genus in waters east of the Rocky mountains. It is found from Canada to Florida and westward to Montana. Covering such a wide range of territory the species is naturally variable and has been described over and over again by many authorities under a great variety of names. The male of this sucker in spring has a faint rosy stripe along the middle of the side. The young are brownish in color and somewhat mottled and have a dark median band or a series of large blotches. The aduits are light olive varying to paler and sometimes darker; sides silvery. The species reaches a length of twenty-two inches, and a weight of five pounds. It is a very common inhabitant of ponds and streams of the low lands, and a small race occurs in certain cold mountain streams of the Adirondack region, where it is dwarfed in size and changed in color, but does not differ in essential characters. Dr. Rothrock also obtained a mountain race of this sucker in Twin Lakes, Col., at an elevation of 9,500 feet above the sea level.

THE STONE TOTER.

The stone roller has a wide distribution and a wonderful variety of common names. Among them are hammer head, stone lugger, stone toter, crawl-a-bottom, hog mullet, mud sucker, hog sucker, banded sucker, large scaled sucker and black sucker.

The species grows very large, reaching a length of two feet. It delights in rapid streams of cold, clear water. Its habit is to rest quietly on the bottom, where its color protects it from observation. It is sometimes found in small schools. The spawning season is in spring and the young are found abundantly in small creeks as well as in the rivers. The food consists of insect larvæ and small shells, and it is especially fitted for securing its prey under stones in the rapids. As a food fish this sucker has little value.

THE CHUB SUCKER.

This is known as the chub sucker, sweet sucker, creek fish and mullet. It has a wide range, practically including all the waters of the United States east of the Rocky mountains. The chub sucker grows to a length of about one foot. It is very tenacious of life, and is a ready biter, but has

little value for food. The young, up to the length of several inches, have a very distinct black lateral band. They are often found in the shelter of water lilies and other aquatic plants close to brackish water.

THE STRIPED SUCKER.

The striped sucker, also called soft sucker, sand sucker and black-nosed sucker, is found in the Great Lakes and south to South Carolina and Texas.

The striped sucker grows to a length of eighteen inches. Old males have the head tuberculate in the breeding season in the spring. The species is very readily distinguished by the dark stripes along the sides produced by spots at the base of each scale. In the young of this sucker there is no lateral line, but in adults it is almost entire.

This species prefers clear, sluggish waters and grassy ponds. It readily adapts itself to life in the aquarium. It feeds almost entirely on mollusks, insects and insect larvæ. The species is not much esteemed as a food fish, although it is sold in large numbers.

THE RED HORSE.

The common red horse, also known as the white sucker, mullet and large-scaled sucker, is an extremely variable species occurring in the Great Lake region, Chesapeake Bay region, south to Georgia and Alabama, and west to Dakota. It is a large species and reaches a length of two feet.

The red horse inhabits clear waters and ascends small streams in May to spawn. As a food fish it ranks low, but the species is freely sold Its food consists principally of mollusks and a small percentage of plants and insects. Minute crustaceans also form a small portion of its food.

THE STONE ROLLER.

The stone roller is likewise called stone toter, stone lugger and steel-back minnow. It is a fish of very wide distribution, ranging from western New York to North Carolina and through Ohio and Mississippi valleys, west to Minnesota and southwest to Texas It is an extremely variable species, and everywhere common. It is, moreover, one of the most singular of American fishes, in having the air bladder surrounded by numerous turns of the long intestine In this respect it is unique among fishes. The stone roller grows to a length of eight inches, but has no importance as food. It feeds upon aquatic plants. The young are hardy in the acquarium, where they feed upon confervæ and diatoms. The sexes are very unlike. The males in the breeding season have the head, and frequently the entire body, covered with large tubercles, and the upper half of the dorsal and anal fins fiery orange and with a dark cross-bar about the middle of these fins.

The species is rather sluggish, but when frightened its movements are very rapid. It is a bottom feeder.

THE RED-BELLIED DACE.

The red-bellied minnow or dace is found from Pennsylvania to Dakota and Tennessee. It is abundant in small streams, and is a strikingly beautiful fish. Along the sides are two blackish bands, one beginning above the eye and extending to the tail; another traverses the eye and follows the lateral line to the base of the caudal, where it ends in a black spot. The belly and the space between the bands are bright silvery, replaced by scarlet red in breeding males, which have the same color at the bases of the dorsal, caudal and anal fins.

In the height of the breeding season the fins are bright yellow, and the body is covered with small tubercles. It reaches a length of three inches, and is similar in its habits to the stone roller, with which it associates. It prefers clear streams, which have their origin in springs. As an aquarium fish this is scarcely excelled in beauty and hardiness, and as a bait for black bass it has few superiors.

THE SILVERY MINNOW.

The silvery minnow, or blunt jaw, according to the present interpretation of the species, occurs from New Jersey to South Carolina, west to Dakota, and southwest to Texas. In the Potomac river there is a large variety described by Girard as *H. regius*, which reaches a length of seven inches. This variety has the body deeper and the eye larger than in the western form. The largest individuals recorded were nine inches long.

This species spawns in the early spring, and is extensively used for food along with the *Notropis hudsonius*, spawn eater, or so-called smelt or gudgeon.

THE FAT-HEAD MINNOW.

The fat-head or black-head is an inhabitant of the Ohio valley and the Great Lake region west to Dakota and southwest to Texas. It is common in sluggish brooks, and instances have been known of its distribution by the action of cyclones. In Iowa it is common in tributaries of the Mississippi.

The fat-head grows to a length of two and one-half inches. The sexes differ in color, the females being olivaceous, while the males are covered with numerous large tubercles. The species has no value as food, but it is an interesting one for the aquarium. Its food consists of mud and algae, and it seems to prefer a muddy bottom.

THE SILVER FIN.

The silver fin ranges from western New York to Virginia and west to Minnesota and Arkansas. It is a common species and a variable one. It reaches a length of four inches. In Iowa it occurs in all the rivers and creeks. It is one of our finest minnows for the aquarium, and is useful as food and bait for larger fishes.

THE ROUGH HEAD.

This is the common shiner, and has received the additional names of red-fin, dace and rough-head. The species is very widely distributed and is extremely variable, and as a consequence some geographical races have received distinct names. It extends from Maine to the Rocky mountains, but it is absent from the Carolinas and Texas. It grows to a length of eight inches.

The upper parts of this fish are steel blue, and the scales are dusky at the edge and base. The sides are silvery, overlaid with a gilt line; there is another gilt band along the back. The belly is silvery, except in spring males, in which it is a bright, rosy color. The male, in the breeding season, has the lower jaw and the top of the head and nape covered with small tubercles. In the breeding condition this is a very handsome species, although the females and the young lack the bright colors of the adult male. In Iowa the species is common and is best known under the name of red-fin. It has no value except as food and bait for more valuable fishes, especially the black bass and pike-perch. The flesh is very soft and cannot be kept long after death.

The shiner runs into small brooks, and is most abundant in eddies and other quiet portions of the streams.

THE SILVER-MOUTHED DACE.

This singular and interesting little fish is found in the Ohio and Mississippi valleys, and has recently been taken in the Mississippi and in west Florida. Northward it ranges to Michigan and west to Kansas.

This dace reaches a length of five inches, and it is one of the most remarkable of the members of the minnow family, because of the depression in the bones of the lower part of the head. The color is olivaceous, with silvery sides. There is a lateral chain of brown dots and a narrow vertebral line. This species has no importance except as food for black bass and other valuable species.

THE LONG-NOSE DACE.

The long-nose dace or Niagara gudgeon is found in New England and the middle states, and in the Great Lake region, in clear, cold water. It grows to a length of five inches. The sides are without the black lateral band, which is characteristic of the black-nosed species. The general color is olivaceous or dark green with the lower parts paler. The back is nearly black. Some of the scales are mottled with dark and olivaceous. The young have a trace of a dusty lateral band. The spring males have the fins, lips and cheeks crimson. Its movements are swift and powerful, and it is a very shapely little fish. As a bait for the black bass it is scarcely surpassed.

THE HORNED CHUB.

The horned chub is known in some localities as nigger chub, river chub and jerker; occasionally it is called horned dace or horny-head. The species ranges from Pennsylvania westward to Dakota and south to Alabama. It abounds in large rivers and is rarely seen in small brooks. This fish grows to a length of ten inches and is good for the table. As a bait for the black bass the young horned chub can not be excelled, because of its endurance on the hook.

THE HORNED DACE OR CHUB.

The common chub, creek chub, smaller fall fish or horned dace has a wider distribution than *S. bullaris*, but it does not grow quite so large, seldom exceeding one foot in length. Its range extends from New England to Missouri, southward to Georgia and Alabama. It is extremely common and ascends the small streams. It reaches four pounds in weight and is a fair food fish. This species is more characteristic of the small streams and clear ponds, and it takes the hook very freely.

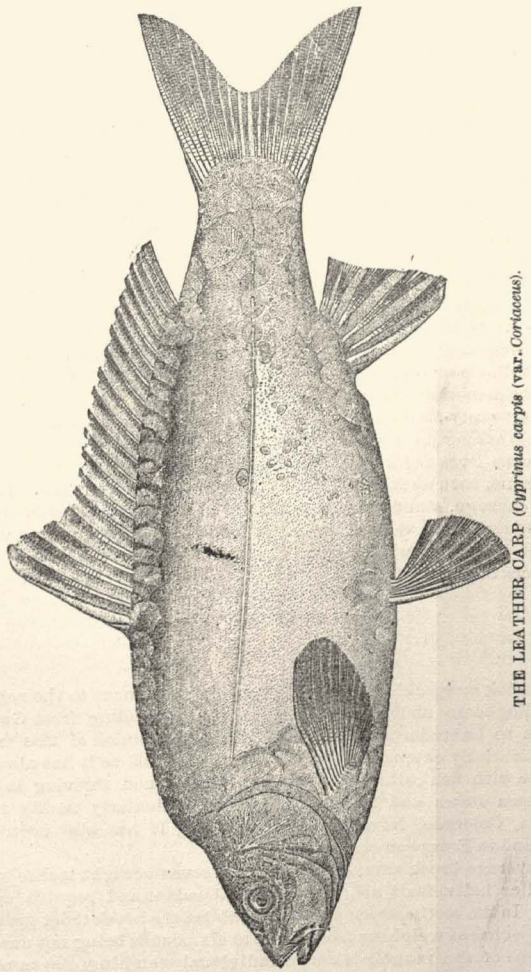
THE ROACH.

The roach, shiner, golden shiner or bream is one of the commonest fishes of Iowa. It is found from New England to Minnesota and southward. A variety of the roach replaces the common northern form from North Carolina to Texas.

The roach grows to a length of one foot and a weight of one and one-half pounds. It frequents sluggish waters, abounding in bayous and weedy ponds, as well as in tidal waters. According to Jordan its favorite shelter is the yellow pond lily. It may be readily distinguished by its shape, which resembles that of a shad, and by the very long anal fin, which contains from fourteen to seventeen rays. The colors of this fish are greenish above and the sides silvery with golden reflections. Fins usually yellowish; lower fins scarlet in breeding males. Although the roach is not a good food fish, it is taken by the hook in large numbers, and is a very useful species for bait.

THE CARP.

The carp is a native of Asia and has been introduced into Europe and America as a food fish, chiefly for pond culture; it thrives in all warm and temperate parts of the United States and reaches its best condition in open waters. In Texas it has grown to a length of twenty-three inches in eleven months after planting. The leather variety is most hardy for transportation. Mr. Hessel has taken the carp in the Black and Caspian seas; salt water seems not to be objectionable to it, and it will live in stagnant pools, although its flesh will be decidedly inferior in such waters. The carp



THE LEATHER CARP (*Cyprinus carpio* (var. *Coriaceus*).

hibernates in winter, except in warm latitudes, takes no food and does not grow; its increase in size in temperate latitudes occurs only from May to August.

The spawning senson beings in May and continues in some localities until August. A carp weighing four to five pounds, according to Mr. Hessel, yields from 400,000 to 500,000 eggs; the scale carp contains rather more than the other varieties. During the spawning the fish frequently rise to the surface, the female accompanied by two or three males. The female drops the eggs at intervals during a period of some days or weeks in shallow water on aquatic plants.

The eggs adhere in lumps to plants, twigs and stones. The hatching period varies from twelve to sixteen days.

According to Hessel the average weight of a carp at three years is from three to three and one-fourth pounds; with abundance of food it will increase more rapidly in weight. The carp continues to add to its circumference until its thirty-fifth year, and in the southern parts of Europe, Mr. Hessel has seen individuals weighing forty pounds and measuring three and one-half feet in length and two and three-fourths feet in circumference. A carp weighing sixty-seven pounds and with scales two and one-half inches in diameter was killed in the Danube in 1853. There is a record of a giant specimen of ninety pounds from Lake Zug in Switzerland. Examples weighing twenty-four pounds have been caught recently in the Potomac river at Washington, D. C.

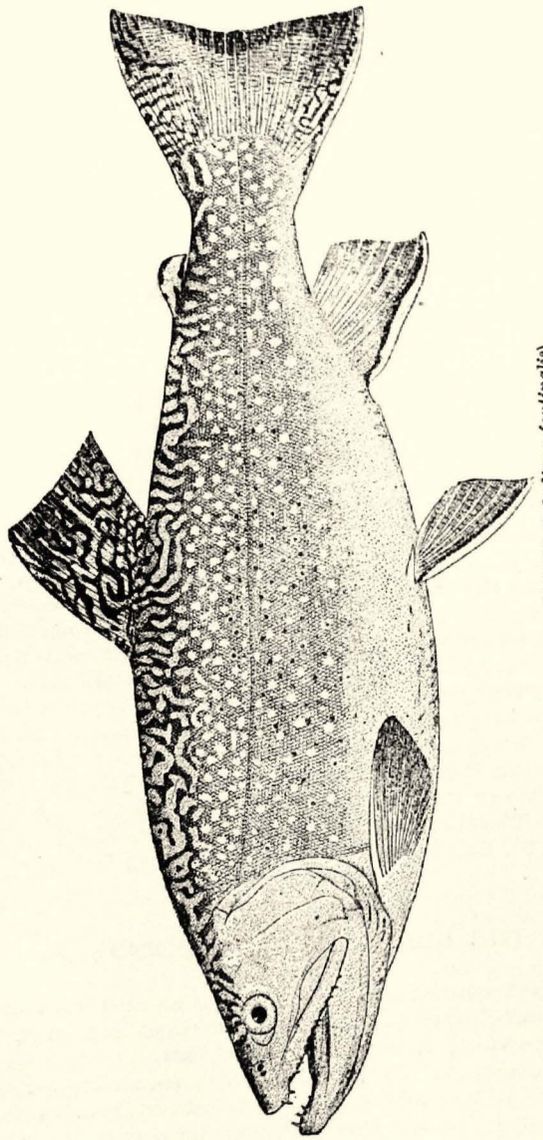
The carp lives principally on vegetable food, preferably the seeds of water plants, such as the water lilies, wild rice and water oats. It will eat lettuce, cabbage, soaked barley, wheat, rice, corn, insects and their larvæ, worms and meats of various kinds. It can be readily caught with dough, grains of barley or wheat, worms, maggots, wasp larvæ, and sometimes with pieces of beef or fish.

THE BROOK TROUT.

The brook or speckled trout of the east is indigenous to the region east of the Alleghenies and the Great Lake region, extending from Georgia on the south to Labrador on the north. The distribution of this trout has been wonderfully extended by artificial introduction, as it has always been a favorite with fish culturists. It is now to be found thriving in many of the western states and territories, and is particularly thrifty in Iowa, Nebraska, Colorado, Nevada and California. It has also been sent to Mexico and to European countries.

The average brook trout seldom exceeds seven or eight inches in length and smaller individuals are much more abundant and require legal protection. In the northeastern part of its habitat the brook trout grows much larger, specimens weighing from three to six pounds being not uncommon, and in one of the rangely lakes an individual weighing eleven pounds is recorded; while Seth Green took a twelve pound specimen in the Sault Ste Marie, and Hallock mentions one which was said to weigh seventeen pounds.

The brook trout does not flourish in water warmer than 68 degrees, and



THE SPECKLED TROUT (*Salvelinus fontinalis*).

prefers a temperature of about 50 degrees. It is an inhabitant of the cold, clear mountain streams, and will leave a region which becomes polluted by mill refuse and other hurtful substances. In the Long Island region and around Cape Cod where the brook trout has free access to salt water, it has the habit of going to sea in the fall and remaining during the winter. It then grows rapidly and becomes a much more beautiful fish than many which live exclusively in fresh water. In hot weather when the temperature of the streams becomes too high and lakes are accessible, trout seek the deep parts of the lakes and the vicinity of cold springs. In streams they are to be found in deep pools or in channels. They feed in spring or early summer among the rapids upon insects and small crustaceans.

The brook trout is the nest builder. Cavities are made in the gravel and the nest is shaped with the tail and the larger stones are carried in the mouths of the parents. After the eggs are deposited they are covered with gravel. The eggs are not all deposited at one time.

Spawning usually begins in October, but brook trout are spawning at some locality in almost every month of the year except midsummer. The egg is about one-fifth of an inch in diameter, and varies in color from pale lemon to orange red.

THE MOON-EYE.

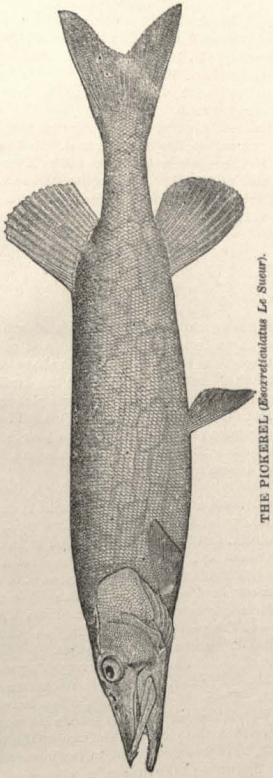
This species is called the moon-eye, toothed herring and silver bass. It is found in Canada, the Great Lake region, and the upper part of the Mississippi valley, being very common in large streams and lakes. It abounds in Lake Erie and the Ohio, and is seined in large numbers.

This species grows to a length of one foot, and, like the other, although a beautiful fish and possessed of excellent game qualities, its flesh is full of small bones. It is a good fish for the aquarium. It will take a minnow or the artificial fly very readily, and the utmost skill is required in its capture. Its food consists of insects, small fishes and crustaceans. Dr. Richardson describes this fish as a member of the minnow family, which, he says, is known to the Canadians under the name of LaQuesche The fish is described as having the back brilliant green, sides and abdomen with a silvery lustre. The specimens which were taken in the Richelieu, where it falls into the St. Lawrence, were about nine or ten inches long.

THE BLACK-SIDED TOP MINNOW.

The black-sided top minnow, or killifish, is an inhabitant of the Mississippi valley and of streams flowing into the Great Lakes from the south. In the Mississippi valley it extends south to Texas.

This species grows to a length of three and one-half inches. It is very abundant in still waters and frequents sloughs and ponds caused by the overflow of streams. In the rivers it seeks the shelter of aquatic plants. It is a surface swimmer, and this fact gives rise to its common name. The species is useful for bait and is well adapted for the aquarium. It is a beautiful little fish and extremely hardy.



THE PICKEREL (*Esox reticulatus Le Sueur*).

THE LITTLE PICKEREL.

This pickerel inhabits the valleys of the Ohio and Mississippi rivers and streams flowing into the Great Lakes from the southward. In ponds formed in the spring by the overflow of river banks it is one of the characteristic fishes and is often destroyed in great numbers by the drying up of such bodies of water. In Iowa the little pickerel, or trout pickerel, is common in the Mississippi and its tributaries.

The fish grows to the length of one foot and is, therefore, too small to have much importance for food.

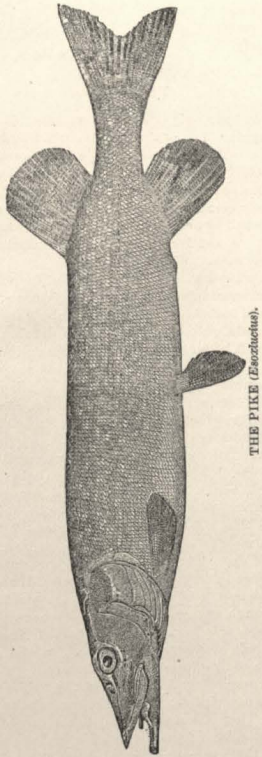
The longest known and most widely distributed species of *Esox* is the common pike—the typical species of the genus. In the subdivision into groups this would be the sole representative of the *Esox* group, which has the cheeks fully scaled and the lower half of opercles naked. The sides are pale spotted, on a darker ground and the size is very much larger than in the pickerels. Fossil remains of the pike have been found in quaternary deposits in Europe.

THE PIKE.

Pike is the best known name for this species, although the misnomer "pickerel" is rather extensively used. The origin of pike is involved in uncertainty; some trace it to the resemblance in shape of the snout to the pike or spear, while others believe it to refer to the darting motion of the fish when speeding through the water. The name pickerel is used in Vermont and around Lake George, New York. "Frank Forester" (Herbert) styles it the great northern pickerel. The name jack is applied in Great Britain to the young pike. *Brochet* is the French name, *hecht* the German and *luccio* the Italian designation of the species.

In the north temperate and arctic regions of North America, Europe and Asia the pike is equally common. In North America it extends from Pennsylvania to high northern latitudes. In Alaska Townsend and others found it above the arctic circle, and Dall and Nelson took it in abundance in the Yukon. From Greenland and the islands of the Arctic ocean the pike appears to be absent. The identity of our American pike with the common one of Europe was recognized by Cuvier and Richardson more than half a century ago; the former compared specimens from Lake Huron with European examples and Richardson with the English pike, and both were unable to find specific differences between the two.

The pike is a voracious fish and destroys everything within its reach in the form of animal life; other fish, water birds and mammals are consumed in enormous numbers. From its concealment, like a beast of prey, it darts out suddenly upon its victims and seldom misses its mark. The pike is even more destructive than the pickerel, and two of the latter, measuring five inches in length, have been reported to eat more than one hundred minnows in a day. Spawning takes place in winter and early spring on shallows and frequently upon meadows. The eggs are about one-eighth inch in diameter and a female weighing thirty-two pounds was estimated by Buckland to contain 595,000.



THE PIKE (*Esox lucius*).

The young pike has a very large yolk sac. The period of hatching varies with the temperature of the water, from fourteen to thirty days. The female is said to be larger than the male; the fish breeds at the age of three years. At the age of one year the fish may reach a length of twelve inches, and, if well supplied with food, it will increase in weight from two to three pounds yearly.

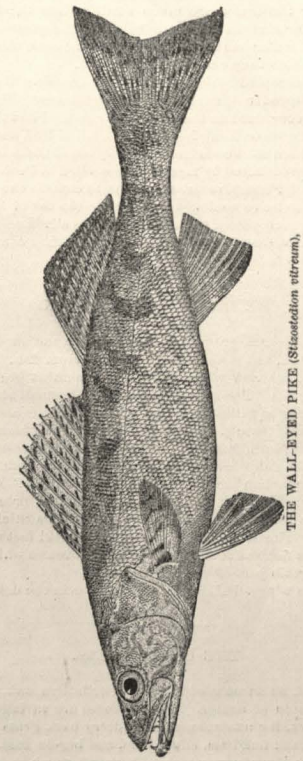
THE EEL.

The eel appears to have only one common name. It is one of the best known and most singular of our fishes, yet its breeding habits are even now enveloped in doubt. The species ascends the rivers of eastern North America, from the Gulf of St. Lawrence to Mexico, the former being the northern limit of the species on our coast. In the Ohio and Mississippi valleys it is extremely common, and its range has been much extended by the opening of canals and by artificial introduction. It has been transferred to the Pacific coast. A similar and perhaps identical species is found in northern Europe and Asia.

The eel has been known to exceed a length of four feet. Dr. Mitchell records a Long Island specimen which weighed sixteen and one-half pounds. The average length of individuals, however, is about two feet. The female is larger than the male, paler in color, and is different in certain other particulars, which will be mentioned in the description of the specimens referred to below. Both adults and young eels ascend the streams in spring, the young coming in millions, but in the fall run small eels are seldom seen. Until a comparatively recent date it was not known certainly that the eels have eggs which are developed outside of the body. Even now the breeding habits are unknown, but it is supposed that spawning takes place late in the fall, or during the winter near the mouths of rivers on muddy bottoms. Dr. Jordan has expressed the belief that the eel sometimes breeds in fresh water, since he has found young eels less than an inch long in the headwaters of the Alabama river about 500 miles from the sea. It is estimated that a large eel contains about 9,000,000 eggs. The eggs are very small, measuring about eighty to the inch, and can scarcely be seen by the naked eye. The ovary of an eel containing this number of eggs was nearly a foot in length and about one-half an inch in greatest diameter. When the eels meet obstructions in streams they will leave the water and travel through wet grass or over moist rocks.

They have not been able to surmount the falls of Niagara. At the foot of this barrier hundreds of wagon loads of young eels have been seen crawling over the rocks in their efforts to reach the upper waters.

For the sake of completing the record of the habits of the eel I quote from W. H. Ballou's description: "They are among the most voracious of carnivorous fishes. They eat most inland fishes except the gar and the chub. They are particularly fond of game fish, and show the delicate taste of a connoisseur in their selections from choice trout, bass, pickerel and shad. In their hunting excursions they overturn huge and small stones alike, working for hours if necessary, beneath which they find species of shrimp and crayfish, of which they are exceedingly fond. They are among the most powerful and rapid swimmers. They attack the spawn of other



THE WALL-EYED PIKE (*Stizostedion vitreum*).

fishes open mouthed, and are even said to suck the eggs from an impaled female. They are owl-like in their habits, committing their depredations at night."

The difference of size in the sexes has already been referred to. According to one writer the males are much smaller than the females, rarely exceeding fifteen or sixteen inches in length. The question whether eels will breed in fresh water has an important bearing upon their introduction into places from which they cannot reach the sea.

The generally accepted belief is that while the eels will grow large and fat they will not reproduce under such circumstances. The male eel has only rarely been recognized on the American coast. I had the good fortune to collect five examples on Long Island in the fall of 1884, and several specimens have been taken at Woods Holl, Mass. One of these latter specimens and several of those collected by myself were studied by Prof. John A. Ryder, of the University of Pennsylvania, and found to contain the male organs so well developed as to leave no doubt concerning the sex of the individuals. These eels, which were known to the fishermen as silver eels, have remarkably large eyes, short snout, and long pectoral fins when compared with the common form.

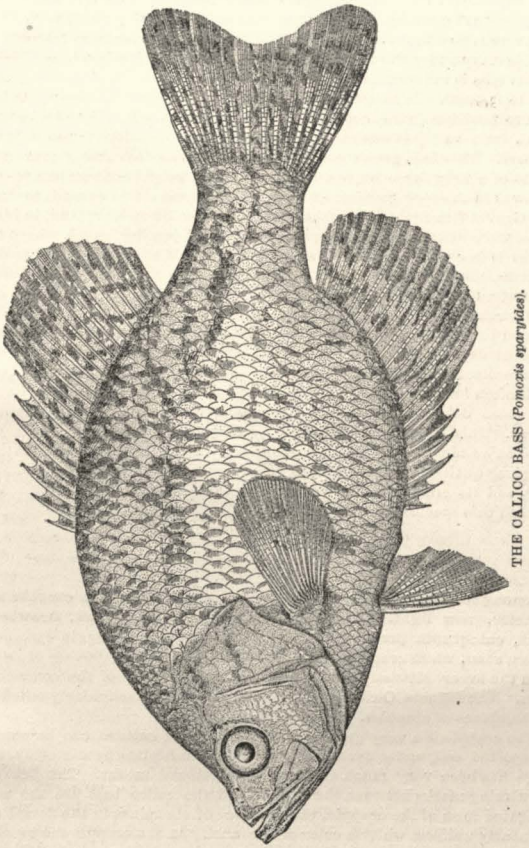
THE BROOK STICKLEBACK.

The brook stickleback grows to a length of two and one-half inches and has no value for food, but is an interesting aquarium fish. It is, however, extremely pugnacious and when kept in confinement great mortality is caused by its quarrels. The species is abundant in small streams, where it secretes itself among aquatic plants and is always on the alert for an attack upon small fishes and insects. Specimens have recently been obtained from an artesian well in South Dakota, the well having a depth of 700 feet. From this great depth the fish were brought up in full strength and vigor and were kept in an aquarium for several months afterwards. A similar occurrence has been recorded by Mrs. Eigenmann in the proceedings of the National Museum for 1883, page 217 of Williamson's Stickleback at San Bernardino, Cal. The well in this case was only 191 feet deep. There is no doubt that the fish reach the wells through streams which become subterranean in a certain part of their course.

This species is a nest builder and is vigorous in the defense of its eggs and young.

THE CALICO BASS.

The calico bass, on account of its wide distribution and variability, has received a profusion of names. Many of these are variations of the term bass. It is known, for example, as strawberry bass, grass bass, lake bass, Lake Erie bass, bank lick bass, silver bass, and big-fin bass. Other names for the species are strawberry perch, chinquapin perch, goggle-eyed perch, silver perch and sand perch. Still other names of local application are bar fish, bitter head, tin mouth, sac-a-lait, lamp-lighter, razor-back, goggle-eye, black crappie and lake crappie.



THE CALICO BASS (*Pomoxis sparyides*).

The distribution of the calico bass is naturally extensive, and it has been still further increased by artificial introduction. The fish has been carried to France, and examples measuring about eight inches in length were recorded there several years ago. There is, however, some confusion in that country between the calico bass and the common sunfish, and there is no doubt that some of the latter species have been introduced into Germany under the mistaken belief that they were calico bass.

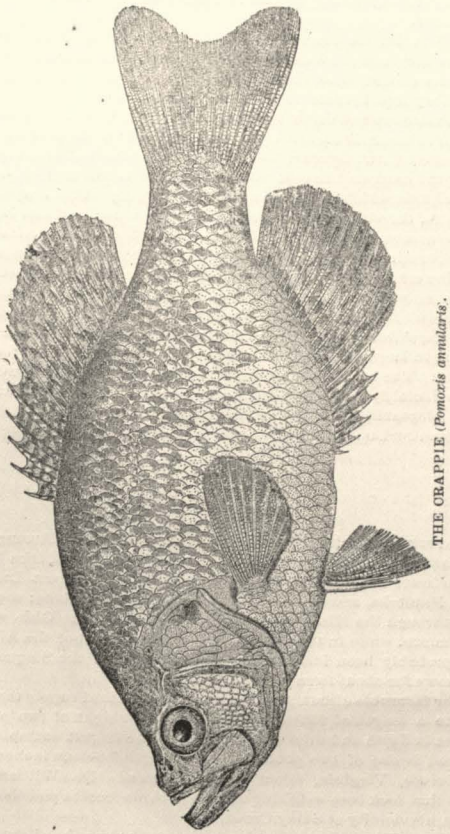
This bass is indigenous east of the Alleghenies from New Jersey southward to Georgia. It abounds in the Great Lake region, Mississippi valley south to Louisiana, most common northward, and it occurs in the Missouri. In the Ohio valley it was rather uncommon until its introduction in large numbers. This bass grows to a length of about one foot and a maximum weight of nearly three pounds, but the average weight is about one pound. It spawns in the spring and the close season in some states extends to June 1st. Gravid females were caught near Havre de Grace, Maryland, in May. These were taken in the Susquehanna and Tidewater canal, where the species is becoming rather abundant. The food of the calico bass consists of worms, small crustaceans and fishes. Although a native of deep, sluggish waters of western rivers and lakes, it readily adapts itself to cold and rapid streams, and thrives even in small brooks. The species is suitable for pond life, and may be kept in small areas of water provided they have sufficient depth. It does not prey upon other fishes, and its numerous stiff spines protect it from larger predaceous species. It swims in large schools and is often found in comparatively shoal water. The nest building habits have been described by Duclos from observations made at Versailles, France. This writer, unfortunately, had under observation both the calico bass and the common sunfish, and his statements need confirmation. The game qualities of this bass are noteworthy. It is a vigorous and free biter, and its endurance is rather remarkable considering its size. As a food fish this species is highly prized.

THE CRAPPIE.

Among the many names which have been applied to the crappie are: Bachelor, new light, Campbellite, sac-a-lait, bridge perch, strawberry perch, chinquapin perch, speckled perch, tin perch, goggle eye, John demon, shad, white crappie and timber crappie.

In the lower Mississippi valley the crappie is one of the commonest fishes. The Illinois, Ohio and Mississippi rivers are particularly noted for an abundance of crappies.

The crappie is a very general favorite for pond culture, can be readily transported and, under favorable conditions, multiplies prodigiously. Its range has been very much extended by artificial means. The best distinguishing marks between the crappie and the calico bass are the more elongated form of the crappie, the presence of six spines in the dorsal and the nearly uniform whitish color of the anal. In the crappie the greatest depth of the body is usually contained two and one-half times in the total length without the tail, while in the calico bass the depth equals one-half the length. These two species are so closely similar in size and habits that they are rarely distinguished except by ichthyologists.



THE CRAPPIE (*Pomoxis annularis*).

The crappie grows to the length of about one foot and usually weighs one pound or less, but in a lake near St. Louis an individual weighing three pounds has been recorded.

Crappie fishing usually begins in June and lasts until the coming of cold weather.

Prof. S. A. Forbes has studied the feeding habits of the crappie and finds that the young live chiefly upon *entomostraca* and small insect larvæ. The adults subsist upon the same food when obtainable, but in times of scarcity they feed to some extent upon other fishes.

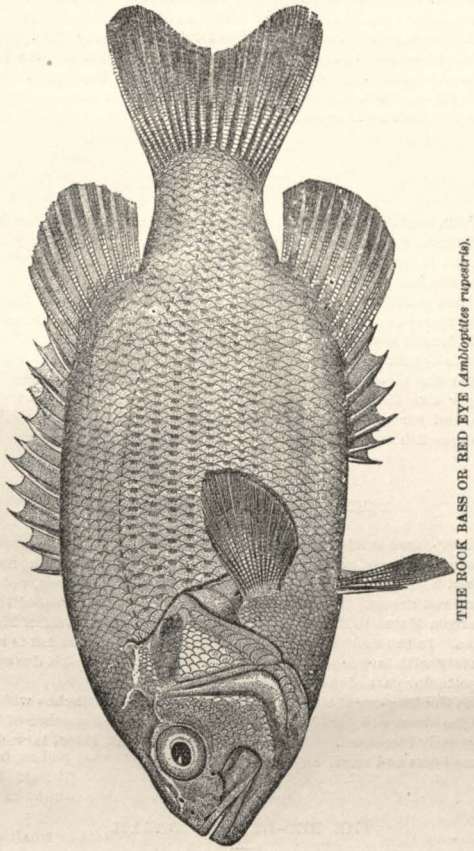
Small minnows and darters have been found in their stomachs. In the autumn Professor Forbes has found a larger percentage of small fishes, sometimes constituting nearly two-fifths of their food. The helgramite is eaten by the crappie. In cold weather it does not consume one-fourth the amount of food which it takes in the early spring. The crappie prefers still waters, thriving even in warm and muddy water, and has been taken in large numbers in mid-summer at depths of only a few feet; in cold weather it retires to deeper water, becomes rather sluggish and takes little food. The crappie is a very free biter and can be caught readily with minnows or worms. Spoon bait has been successfully used in trolling for this species. It is recorded that two men have taken a thousand crappies in three days' fishing with hook and line. As the fish is gregarious, congregating in large schools, and fearless, it can be taken in the large numbers cited. The best bait for crappie is a small shiner. It rises well also to the artificial fly. As a food fish this is one of the best in our inland waters, and its adaptability for life in artificial ponds should make it a favorite with fish culturists.

THE ROCK BASS.

The rock bass is known under a variety of names. Among them are the following: Red-eye or red eyed perch, goggle-eye and lake bass. It is found in lower Canada, Vermont and throughout the Great Lake region, west to Manitoba, and it is native in Minnesota and Dakota; southward it ranges through the Mississippi valley to Texas. In the Ohio valley it is very common. while in the middle Atlantic states, east of the Alleghanies, it has probably been introduced. Its existence in the Susquehanna has been known for about twenty years.

Under favorable circumstances as to water and food supply the rock bass grows to a length of fourteen inches and a weight of two pounds. It increases in depth and thickness with age. The largest example we have examined is one of two pounds weight, length fourteen inches, from the James river, Virginia, taken near Richmond. Dr. William Overton reports that rock bass weighing three and three-fourths pounds have been taken in his vicinity at Stony Creek, Va

In February and March this fish frequents the mouths of small streams and in summmer it seeks shady places under high banks or projecting rocks. This species is gregarious, going in large schools. It thrives where there is not much current and is very well adapted for culture in artificial ponds. It is as common in lakes and ponds as in the streams. Sluggish,



THE ROCK BASS OR RED EYE (*Ambloplites rupestris*).

pure, dark water suits it best. The fishing season begins in June and lasts until the approach of cold weather.

The rock bass feeds upon worms, crustaceans and larvæ of insects early in the season; later its food consists of minnows and crayfish. The young feed upon insects and their larvæ. The spawning season is in May and June and gravelly shoals are resorted to for depositing the eggs.

The rock bass bites very freely and is a fair game fish and excellent for the table. It fights vigorously, but its endurance is not great. Suitable baits are white grubs, crickets, grasshoppers, crayfish and small minnows. Common earthworms are also successfully used.

THE BLUE SUNFISH.

The blue sunfish, blue bream, copper-nosed bream or dollerdee, is a very widely-diffused species and varies greatly in size, color and length of the earflap. It is found in the Great Lakes and throughout the Mississippi valley to Mexico.

The blue sunfish grows to a length of nearly one foot and individuals weighing nearly two pounds are on record. Adults, however, average eight inches in length with a weight of less than one pound. The size of the individuals depend upon the habitat. In large lakes and streams it attains to a larger size than in small bodies of water. In southern waters it grows to a larger size than in northern waters. It lives in ponds as well as in streams, and thrives in warm waters. It is considered equal to the rock bass as a pan fish and can very readily be taken by hook fishing.

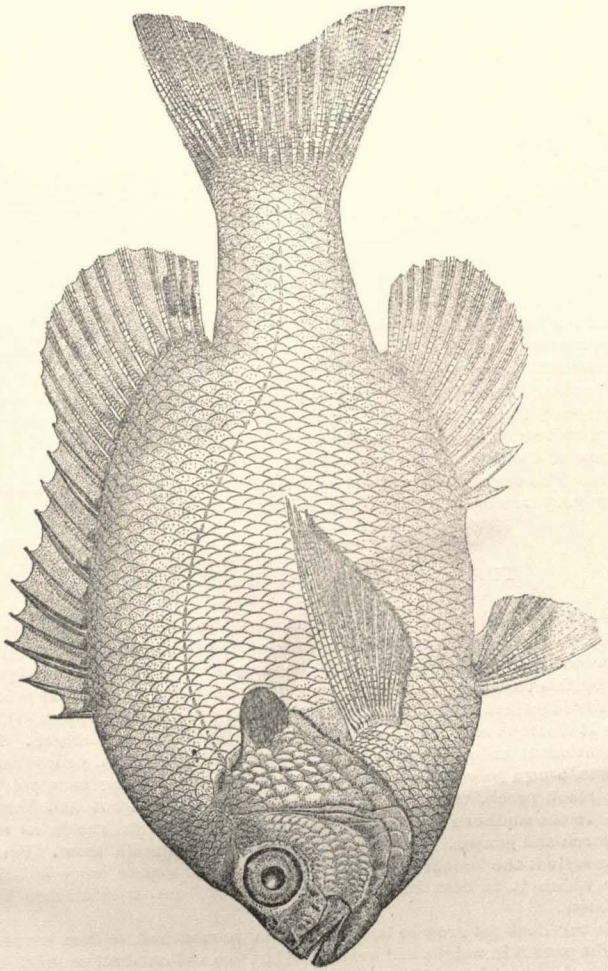
THE LONG-EARED SUNFISH.

The long-eared sunfish has a very extensive range and is known under many common names, among which are the following: Bream, red-tailed bream, red-head bream, red-bellied bream, perch, sun perch, red-bellied perch and red breast. The species is common in streams east of the Alleghenies from Maine to Florida, and in tributaries of the Gulf of Mexico to Louisiana. In the southern states the typical long-eared sunfish is replaced by a variety with larger scales on the cheeks and belly and a dusky blotch on the posterior part of the soft dorsal fin.

In size the long-eared sunfish averages about eight inches when adult and weighs about one pound. In the south the size and number of individuals is greatly increased. This fish feeds upon worms, insect larvæ, crustaceans, mollusks and small fishes.

THE RED-BELLIED BREAM.

The red-bellied bream or long-eared sunfish is very abundant in the Ohio valley and also in tributaries of Lake Erie and Lake Michigan. It extends west to Dakota, south to South Carolina and Mexico, but is absent from



THE BLUE SUNFISH (*Lepomis pallidus*).

Atlantic waters of the northern and middle states. It is especially abundant in small brooks. The species grows to a length of eight inches and is one of the handsomest of the sunfishes. The specific name is derived from the large opercular flap, generally spoken of as the ear flap.

The sides are blue and orange, the blue occurring in undulating streaks, and the orange in spots. There are distinct blue stripes on the head. The thin membranes are generally orange and the rays blue. This fish is extremely variable and has been described under about twenty different names. According to Dr. Johnson it avoids muddy water and frequents deep, still places in rivers and clear ponds. It runs into very small streams. The red-bellied bream is used for food and takes the hook very freely.

THE COMMON SUNFISH.

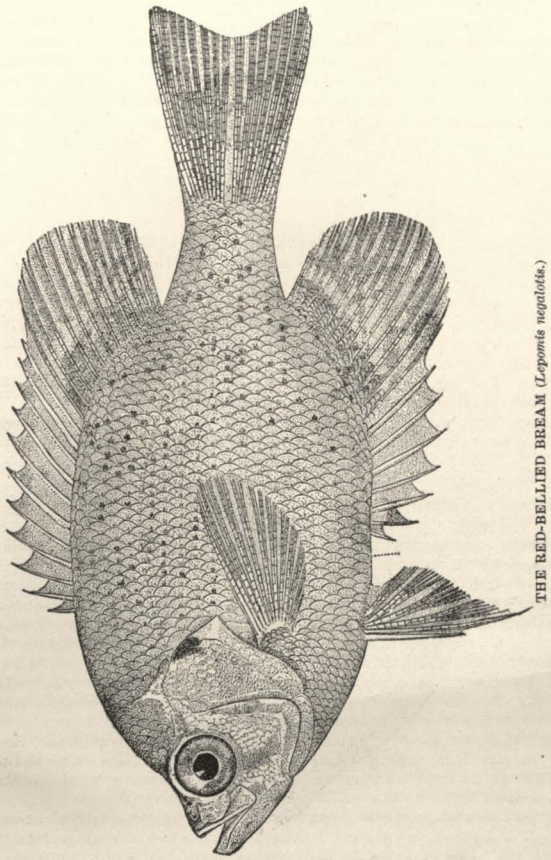
The common sunfish or sunny, pumpkin seed, bream, tobacco box and pond sunfish, is one of the best known of the native fishes of Iowa. It is found from Maine westward through the Great Lake region to Minnesota, and in the eastern states to South Carolina. In western rivers, however, it is seldom found south of the latitude of Chicago. It grows to a length of eight inches, and a weight of one-half pound. Its food is similar to that of the long-eared sunfish, and it is one of the readiest biters known to the angler. The nest is a depression in the mud, sand or gravel, hollowed out by means of the fins. The male watches the nest and drives away all intruders. The eggs are only about one-thirty-second of an inch in diameter and not very numerous. They are attached to stones and aquatic plants.

THE SMALL-MOUTHED BLACK BASS.

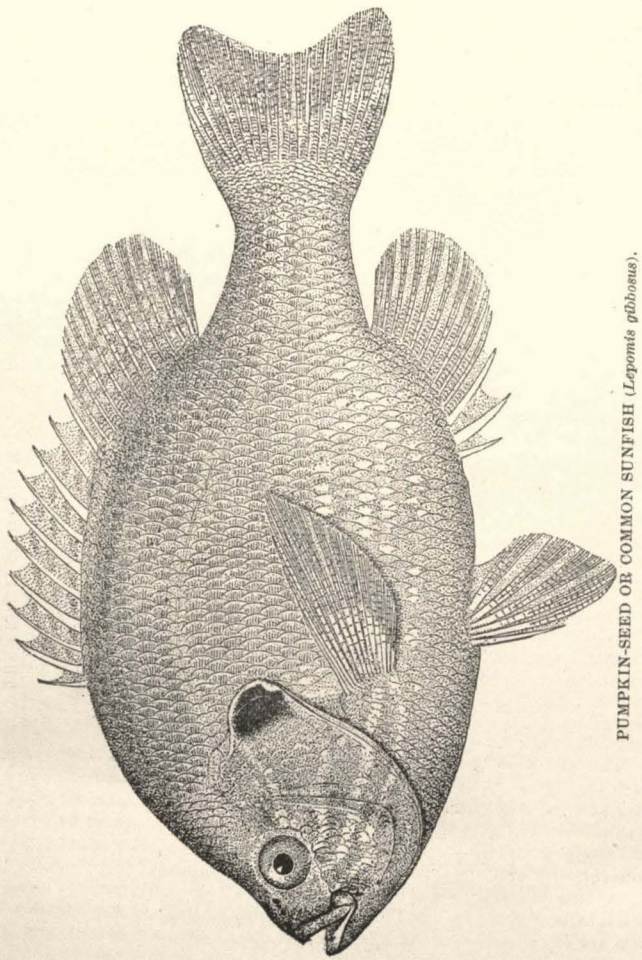
One of the early names for the small-mouthed black bass is that of growler, which appears in the writings of Cuvier, who was under the impression that the name was applied because of a noise sometimes produced by this bass. At the time of his writing the name growler was pretty generally identified with the black bass. Among the names applied to this fish by Rafinesque are lake bass, big bass, spotted bass and achigan. He also mentions it under the names painted tail, bridge perch, yellow bass, gold bass, brown bass, dark bass, minny bass, little bass, hog bass, yellow perch, black perch, trout perch, streaked head, white trout and brown trout. In the southern states the small-mouthed form is known as the trout perch and jumper. In Alabama it is called mountain trout. Some persons style it the bronze backer. The most appropriate name and the one by which it is best known is that of black bass or small-mouthed black bass.

This bass does not grow so large as the large-mouthed, seldom exceeding eight pounds in weight and averaging but two and one-half pounds. A fish of the latter weight will measure fifteen inches in length, while one of eight pounds would measure two feet.

The food of the black bass consists of crayfish, frogs, insects and their larvæ, minnows and other aquatic animals of suitable size. The young can



THE RED-BELLIED BREAM (*Lepomis megalotis.*)



PUMPKIN-SEED OR COMMON SUNFISH (*Lepomis gibbosus*).

be fed on small fresh water crustaceans, such as *Daphnia* and *Cyclops*. Among the successful baits for this species are stone catfish, helgramites and crickets.

This bass prefers rapid water, is extremely active, and frequents clear, rapid-flowing streams where the water is pure, and thrives in greater elevations than trose preferred by the large-mouthed. It hibernates in winter and spawns in the shallow or gravelly bottoms in spring. It follows its prey into shallow water, and frequently leaps far out of water in its efforts to escape from the hook or when frightened by the sudden approach of an enemy. It swims in schools and is often found in the shelter of sunken logs and in the vicinity of large rocks.

The spawning season begins in March and ends in July. The period of incubation lasts from seven to fourteen days. The eggs are bound together in bands or ribbons by an adhesive substance. They adhere to stones on which they are deposited. The parent fish build nests and protect the eggs and young. By some writers it is believed that the female prepares the nest before the male joins her. The males fight for the possession of the female, and are said to help the process of ejecting the eggs by biting or pressing the belly of the female. After the eggs are deposited the female guards the nest from the attacks of the crayfish and some other enemies. The young are consumed by many birds and by frogs and snakes, yet notwithstanding the numerous enemies of the black bass its multiplication has been rapid and enormous.

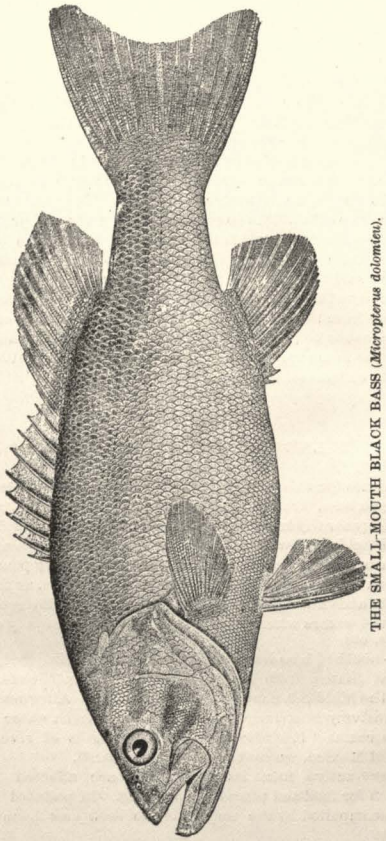
THE LARGE-MOUTHED BLACK BASS.

Common names for this species are Oswego bass, river bass, green bass, moss bass, bayou bass, trout, jumper, chub and Welshman. Throughout the North it is generally known as bass, in Virginia and North Carolina as chub, and in Florida and west to Texas as trout. The average weight of the large-mouthed bass in southern waters is less than five pounds, and still less in northern waters. In Florida it attains a large size, as much as three feet in length, and a weight of twenty-five pounds. Its growth and size depend upon the waters where found, the natural food supply of small fish crayfish, frogs, etc.

The large-mouthed bass has a wide distribution, being indigenous to the eastern United States, from Manitoba to Florida and Texas, except New England and the Middle Atlantic states east of the Alleghenies, where it has been extensively introduced. It inhabits the fresh water ponds, lakes and sluggish streams. It is also found at the mouths of rivers emptying into the Gulf of Mexico, where the water is brackish.

It is a very active fish; its movements are affected by seasonal changes, search for food and places of spawning. In polluted streams the bass are often compelled by the impurities to seek new haunts and pure water.

The young bass feed upon animal food at an early age. The large-mouthed bass is said to be more cannibalistic than the small-mouthed. Small fishes (minnows) of all kinds, crayfish, frogs, insects and their larvæ and aquatic animals of all kinds, suitable in size, make up the diet of this



THE SMALL-MOUTH BLACK BASS (*Micropterus dolomieu*).

fish. It feeds both at the surface and on the bottom, pursuing its prey with great activity. When surrounded by seines or caught on hooks this species will often leap five or six feet out of the water, and its habit of jumping over the cork lines of seines has given it the name of "jumper."

In cold weather the bass seeks deep places, often hibernating under rocks, sunken logs and in the mud. Favorite localities are under overhanging and bush-covered banks in the summer, and among aquatic plants where the fish lies in weight for its prey. The spawning season of the large-mouthed bass is about the same as that of the small-mouthed species, beginning in April and lasting until July. Its eggs are adhesive, sticking to stones during the incubation period, which lasts from one to two weeks, according to the temperature of the water. The young bass remain in the nest a week or ten days, and at the age of two weeks will measure about three-fourths of an inch in length. In suitable waters it is estimated that the large-mouthed bass will weigh, at the age of three years, from two to four pounds.

THE JOHNNY DARTER.

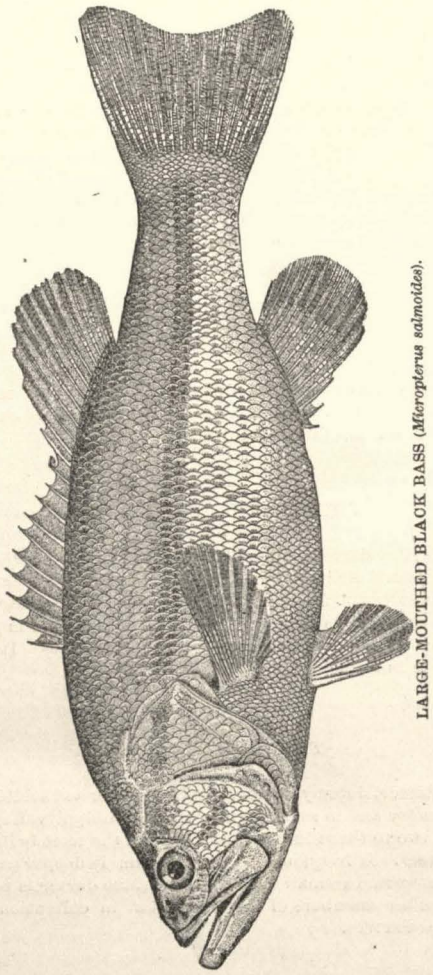
The Johnny darter ranges from western Pennsylvanian to Missouri and Dakota. In the Great Lake region it is abundant, and is one of the commonest darters in the streams of Iowa.

THE BLACK-SIDED DARTER.

The black-sided darter or blenny darter is found from western Pennsylvania to Dakota and Arkansas. It grows to a length of four inches, and is among the most beautiful of the darters. It prefers clear streams with gravelly bottoms, and is more active in its habits than most of the other species, not concealing itself so closely under stones. It is admirably adapted for life in the aquarium.

THE BLUE DARTER.

The blue darter, Johnny darter, rainbow darter and soldier fish, is found in the Ohio valley and in some parts of the Mississippi valley. It reaches the length of two to three inches, and is one of the most brilliantly colored of all the darters. It frequents gravelly bottoms in deeper parts of streams, and is not common in small brooks. The blue darter is not so active as some of the other members of its family, but in coloration it is the most beautiful of all darters.



LARGE-MOUTHED BLACK BASS (*Micropterus salmoides*).

THE YELLOW PERCH.

The yellow perch, ringed perch or striped perch is found throughout the Great Lake region, rivers and ponds of New England and northwestward, and in streams east of the Allegenies south to Georgia. It does not occur in the Ohio valley or southwest.

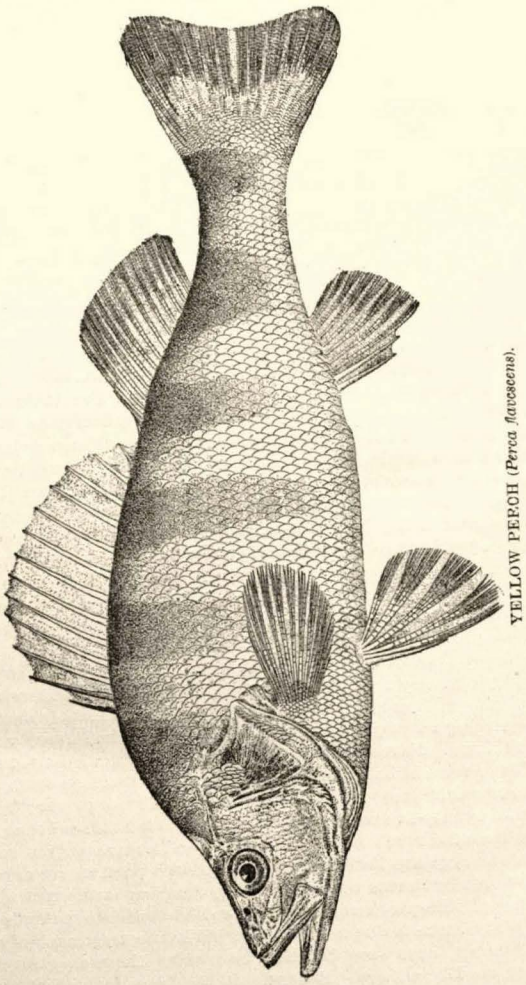
The species reaches a length of one foot and weight of two pounds. It is one of the best known of our food fishes and has excellent game qualities. Its flesh, however, is rather soft and coarse and is far inferior to that of the black bass and other members of the sunfish family. It is a voracious feeder, its food consisting of small fishes, crustaceans, and other animal matter.

The yellow perch spawns early in the spring. The eggs are adhesive and enclosed in thin translucent strips of adhesive mucus.

THE PIKE-PERCH.

The pike-perch has received a great many common names. One of the most suitable is that of "Susquehanna salmon," which is used in Pennsylvania. In the eastern states the species is styled the perch-pike or the pike-perch, glass-eye and wall-eyed pike. In the Great Lake region it is known as blue pike, yellow pike, green pike and grass pike. In the Ohio valley and western North Carolina it is the jack; in Lake Erie and Canada, the pickerel; in some parts of the Ohio valley it is the white salmon or jack salmon. The Cree Indians call it the okow and the French Canadians dore or picarel. Among the fur traders of British America it is called the horn-fish.

The pike-perch, or wall-eyed pike, inhabits the Great Lake region, and extends northward into British America, where it has been recorded as far as fifty-eight degrees north by Dr. Richardson. It ranges south in the Mississippi valley to Arkansas, and in the Atlantic streams to Georgia. This species is said to reach a weight of fifty pounds, but the average weight of the market specimen is less than five pounds. In the Susquehanna it occasionally reaches ten pounds or upwards in weight. The pike-perch feeds on the bottom upon other fishes, and has been charged even with destroying its own young. It prefers clear and rapid waters, and lurks under submerged logs and rocks, from which it can readily dart upon its prey. Spawning takes place in April and May, and in Pennsylvania continues until June. Favorite spawning places are on sandy bars in shallow water. The period of hatching varies from about fourteen to thirty days, depending upon the temperature of the water. The eggs vary from about seventeen to twenty-five to the inch, and a single female has been estimated to contain from 200,000 to 300,000. In a state of nature only a small percentage of the eggs are hatched out; the greater portion are driven upon the lake shores by storms and devoured by fishes upon the spawning beds. The number of pike-perch annually hatched by artifical methods is enormous. This advance is due to improvements in the treatment of adhesive eggs. Formerly these were hatched by placing them on glass plates, to which they readily adhere. Recently it has been found that the sticky substance can be washed off the eggs, after which they are placed in jars and hatched like eggs of the shad and whitefish. Iowa has distributed a large number of pike-perch throughout the state.



YELLOW PERCH (*Perca flavescens*).

THE SAUGER.

The sauger is known also as sand pike, gray pike and green pike, pickering, pickerel and horse fish. It is found in the St. Lawrence river and the Great Lake region, the upper Mississippi and Missouri rivers and in the Ohio, where it is said to have been introduced from the lakes through canals.

This is a small fish, seldom exceeding eighteen inches in length, and embraces several varieties, only one of which is found in Pennsylvania, the one called gray pike. It is a very common fish in the Great Lakes and is abundant in the Ohio river. It is doubtful whether it is native to Ohio or introduced. It is very extensively used for food but is not equal to the pike perch.

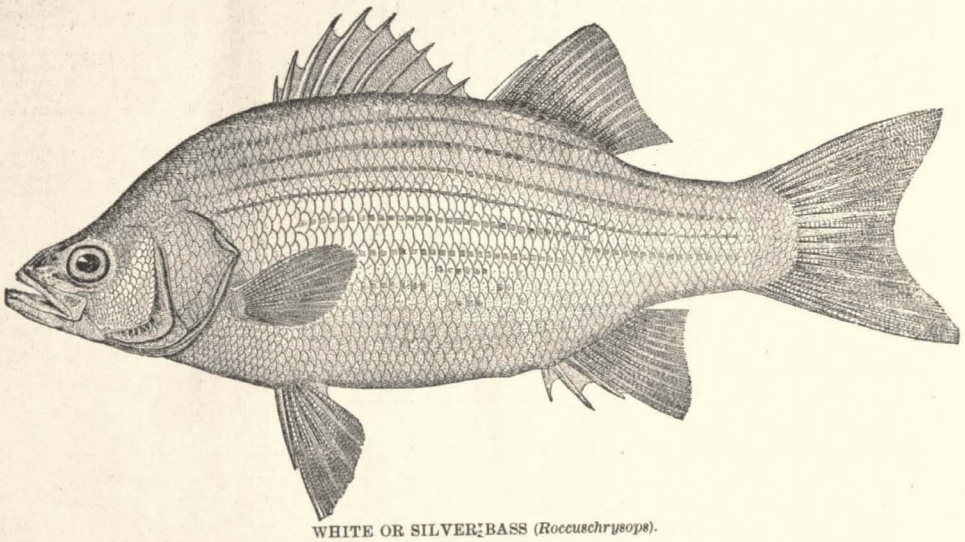
THE WHITE OR SILVER BASS.

The white bass is sometimes called striped bass, and is probably the silver bass of Canada. Its center of abundance is the great lake region, but it is also widely distributed over the Ohio and Mississippi valleys. In Iowa the species is found in the Mississippi and its tributaries. The white bass weighs from one to three pounds, and its flesh is considered almost, if not equally, as good as that of the black bass. It prefers the deeper parts of rivers and thrives best in lakes and ponds. In April and May they leave the deeper waters and go in near shore or to the mouths of rivers, where they spawn. The spawning period is in May and June.

The white bass feeds upon minnows, crayfish, and other fresh water crustaceans, also minute mollusks or shell fish, and is said to devour many young whitefish upon the spawning grounds of that species. It is a game fish and affords good sport to the angler.

THE YELLOW BASS.

The yellow bass appears to have no other common name. It inhabits the lower Mississippi valley, extending northward to southern Indiana and Illinois. The species grows to the length of one foot. Nothing is recorded about its habits, which are supposed to resemble those of the white perch.



WHITE OR SILVER BASS (*Roccuschrysops*).

IOWA'S MEANDERED LAKES.

A statement of the meandered lakes of Iowa, their locality, area, and shore line, as shown by the meander notes of the government survey of same.

LAKE.	LOCALITY OF LAKE.			Estimated area in acres.	ESTIMATED SHORE LINE.		
	Township.	Range.	COUNTY.		Miles.	Chains.	Links.
*Goose lake, in sections 28,29, 32 and 33	N 83	E 5	Clinton	301.55	2	65	48
Muscatine slough in sections 7, 17, 18, 20, 21, 28 and 29	N 74	W 2	Louisa	570.00	19	31	40
Clum lake	75	2 and 3	Louisa	152.00	3	15	11½
Green bayou, in sections 26, 27, 28, 29, 31, 32 and 33	68	3	Lee	271.00	8	48	37
Keokuk lake, in sections 13, 22, 23,24, 26 and 27	76	3	Muscatine	454 00	5	26	33
Lake in sections 1 and 2	96	3	Allamakee	163.86	2	50	68
Lakes in section 16, 20 and 21	88	4	Delaware	44.25	1	52	27
Two lakes in sections 13, 24 and 25	100	4	Allamakee	200 00	3	33	.....
Swan lake	80 and 81	7	Johnson	45.00	1	10	55
Lake in sections 4, 5, 8, 9, 16 and 17	99	3	Allamakee	679.00	6	16	39
Lake in sections 30 and 31	81	7	Johnson	62 73	2	6	.....
Clear lake	96	22	Cerro Gordo	3,643 37	13	35	42
†Lake Rice	99	22 and 23	Worth and Winnebago	600.00	7	56	75
Silver lake, in sections 14 and 15	100	22	Worth	318.00	3	8	95
Bright's lake in sections 7, 8 and 17	100	22	Worth	155.00	2	18	50
Iowa lake, in sections 14, 15, 22, 23, 24, 25 and 26	88	23	Hamilton	886.84	6	34	13
Wall lake, in sections 9, 10, 15 and 16	86	24	Hamilton	304.56	2	67	.....
Lake in section 27	87	24	Hamilton	142 00	2	1	55
Cairo lake	87	24 and 25	Hamilton	1,382.00	8	53	43
Walled lake, in sections 2, 3, 10, 11. 14 and 15	90	24	Wright	986.85	5	73	91
Cornella lake, in sections 9 and 16	92	24	Wright	332 42	7	71	97
Elin lake, in sections 21, 22, 27 and 28	92	24	Wright	450.38			
Twin lake in sections 28 and 29	93	24	Wright	107.07	1	67	32
Lakes in sections 19, 20, 29 and 30	94	24	Hancock	193.00	3	4	20
Lake	96	24 and 25	Hancock	106.00	.....	.....	.....
Lake	96	24 and 25	Hancock	915.00	5	22	84
Duck lake, in sections 20 and 21	100	24	Winnebago	71.30	1	27	40
Lake, in se qr of section 24	96	25	Hancock	59.00	1	7	47
Lake, in sections 9, 10, 15 and 16	97	25	Hancock	252.68	2	63	13
†Impassable marsh	91 and 92	27	Humboldt	1,745.20	9	22	15
Owl lake, in sections 21, 22, 27 and 28	92	27	Humboldt	772.14	4	65	.....

MEANDERED LAKES—CONTINUED.

LAKE.	LOCALITY OF LAKE.			Estimated area in acres.	ESTIMATED SHORE LINE.		
	Township.	Range.	COUNTY.		Miles.	Chains.	Links.
Lake	90 and 91	29	Webster and Humboldt	211 00	3	40	.....
Bass lake	91	29 and 30	Humboldt	208 00	2	60	87
Bancroft lake, in sections 10, 14 and 15	100	29	Kossuth	125.00	3	60	79
Lake	84	30 and 31	Greene	715.00	3	68	73
Lake, in section 17	100	30	Kossuth	76.43	1	35	.....
Lake, in section 28	000	30	Kossuth	147.40	2	40	.....
Lake, in sections 9 and 10	100	30	Kossuth	48 00	..	75	.....
Lizard lake, in sections 22 and 27	91	31	Pocahontas	252.38	2	75	75
Iowa lake, in sections 11, 12 and 14	100	31	Emmet	285 00	3	42	75
Walled lake	88 and 89	32 and 33	Calhoun	571.00	6	32	51
Lake (medium)	96 and 97	32 and 33	Palo Alto	980.00	12	57	21
Swan lake (seven or eight miles long)	99	32 and 33	Emmet	2,300.00	22	30	70
Lake Okamanpadu, in sections 10, 11 and 12	100	32	Emmet	945.00	3	58	.....
Tremont lake	100	32 and 33	Emmet	147 00	2	16	86
Lake, in section 10	86	33	Calhoun	160 84	2	3	79
Lake, in sections 1, 2, 11 and 12	88	33	Calhoun	490.00	4	41	59
High lake, in sections 11, 12 and 13	98	33	Emmet	461.00	3	43	.....
Lake, in sections 14, 15 and 23	98	33	Emmet	337 00	4	70	29
Swan lake, in sections 27, 28, 33 and 34	99	33	Emmet	412.28	5	40	.....
Lake, in sections 16 and 17	100	33	Emmet	177.20	2	68	.....
Tow Head lake, in sections 23 and 24	89	34	Calhoun	195.05	2	16	6
Clear lake	91 and 92	34	Pocahontas	170.00	3	2	62
Two lakes, in sections 9, 15, 16 and 17	93	34	Pocahontas	616 00	7	15	28
Rush lake, in sections 20 and 21	94	34	Palo Alto	501.15	4	1	20
Silver lake, in sections 18, 19, 21, 28 and 29	95	34	Palo Alto	656.00	5	71	23
Lake, in sections 29 and 30	96	34	Palo Alto	192.57	7	29	35
Lake, in sections 16, 17, 19, 20 and 21	96	34	Palo Alto	458.42			
Eagle lake, in sections 11, 14 and 23	100	34	Emmet	.....	.....	.....	.....
Lost Island and Pelican lakes	96 and 97	35 and 36	Palo Alto and Clay	3,425.00	28	3	15
Trumbull lake	95 and 97	35	Clay	1,773 00			
Twelve Mile lake, in sections 20, 21 and 29	98	34	Emmet	300 95	3	27	23
Cheever lake, in sections 20, 21 and 29	99	34	Emmet	316 43	4	74	16
Lake	99	34 and 35	Emmet and Dickinson	219.00	1	69	32
Lard lake, in sections 4, 5, 8 and 9	89	35	Sac	246 19	2	48	31
Rush lake, in sections 8 and 17	89	35	Sac	63.60	1	26	5
Lake	93 and 94	35	Buena Vista and Clay	172.97	2	13	60
Lake, in sections 25 and 26	94	35	Clay	235 23	2	22	62

Lake	95 and 96	35	Clay	306.00	1	40	95
Lake, in sections 8, 9, 16, 17 and 20	97	35	Clay	219 00	4	32	97
Lake, in sections 7 and 18	99	35	Dickinson	127.00	1	63	.....
Lake	99	35 and 36	Dickinson	110.00	2	7	75
Lake, in sections 22, 23, 26 and 27	100	35	Dickinson	375.15	4	38	73
Wall lake	86 and 87	36	Sac	907.00	9	30	30
Spirit lake	100	36	Dickinson	5,600 00	23	73	86
Okoboji, east	99 and 100	36	Dickinson	1,842.00			
Okoboji, west	99	36 and 37	Dickinson	3,993.00	38	38	7
Gar lakes, in sections 29, 30 and 32	99	36	Dickinson	406.00			
Two lakes	99 and 100	36	Dickinson	194.00	3	32	84
Lake, in sections 5, 6, 7 and 8	99	36	Dickinson	293 42	3	7	85
Lake, in section 23	99	36	Dickinson	136 37	2	1	20
Lakes (four), just west of Spirit lake	100	36	Dickinson	900.00	12	25	25
Storm lake	90	37	Buena Vista	3,224 47	9	61	67
Lake, in sections 31 and 32	99	37	Dickinson	143.00	3	12	24
Lake, in sections 30 and 31	99	37	Dickinson	157.40	2	62	24
Diamond lake, in sections 10, 11, 14 and 15	100	37	Dickinson	164 55	2	4	15
Lake, in sections 23, 24, 25 and 26	100	37	Dickinson	70.90	1	24	30
Lake	100	36 and 37	Dickinson	50.00	1	14	21
Silver lake, in sections 27, 28, 29, 32, 33 and 34	100	38	Dickinson	1,047 40	6	41	79
Lake on Minnesota state line	100	39	Osceola	165.90	2	1	70
Rush lake	100	39 and 40	Osceola	357.53	3	33	61
Wabonsie lake, in sections 2 and 3	70	43	Fremont	260.00	1	67	38
Lake, in sections 29 and 32	74	43	Pottawattamie	72 48	1	53	50
Lake, in sections 11, 14, 15, 22 and 23	75	44	Pottawattamie	430 79	6	39	40
Lake, in sections 2, 3, 10 and 11	76	44	Pottawattamie	234 63	4	19	77
Boyer lake, in sections 21, 22, 27 and 28	76	44	Pottawattamie	593.00	5	10	25
Lake	77 and 78	45	Pottawattamie and Harrison	76 78	2	4	85
Lake, in sections 22, 23 and 26 (Soldier)	78	45	Harrison	266.91	4	48	99
Lake, in sections 2, 11, 14, 15, 22 and 27	80	45	Harrison	532.00	8	.....	20
Lake, in sections 13, 14, 23 and 24	80	45	Harrison	416 88	3	25	69
Blue lake	83 and 84	45 and 46	Monona	1,598 60	10	28	63
Lake, in sections 10, 11, 12, 13, 14, 23, 24, 26, 27 and 34	86	47	Woodbury	991.27	13	8	59

*Goose lake, in Clinton county, was drained, surveyed, and approved as swamp land and patented to the county as swamp land, October 7, 1886.

†The "Impassable marsh," in Humboldt, has been surveyed, approved, and patented to the state as swamp land, and patented by the state to Humboldt county.