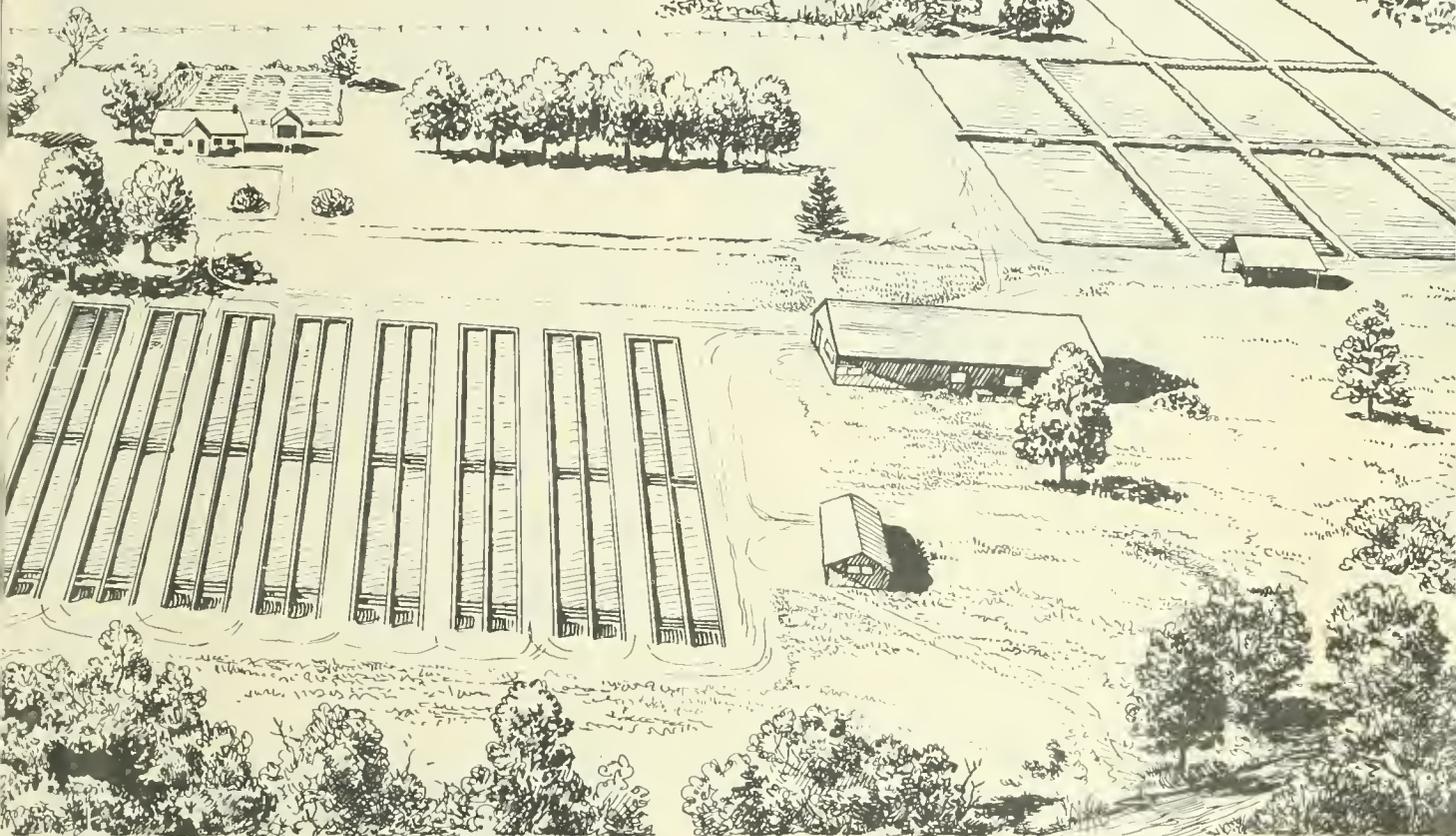


A Visit to a Federal Fish Hatchery

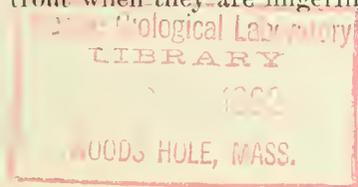


We raise rainbow and brown trout here. Other Fish and Wildlife Service hatcheries raise different species of trout, like brook trout and cut-throat trout. Still other hatcheries raise a number of other kinds of fish. Each hatchery propagates the kind of fish needed to support fishing in the waters stocked by the hatchery—waters in national parks and forests, wildlife refuges, and other fishing areas, and in farm fish ponds.

We plant—that is, we place in lakes—some of our trout when they are fingerlings, about $1\frac{1}{2}$ to

5 inches long. We plant them as fingerlings if it is likely to be some little time before fishermen will catch them, and if they will have a chance to feed on plenty of insects, insect eggs and larvae, and smaller fish or worms.

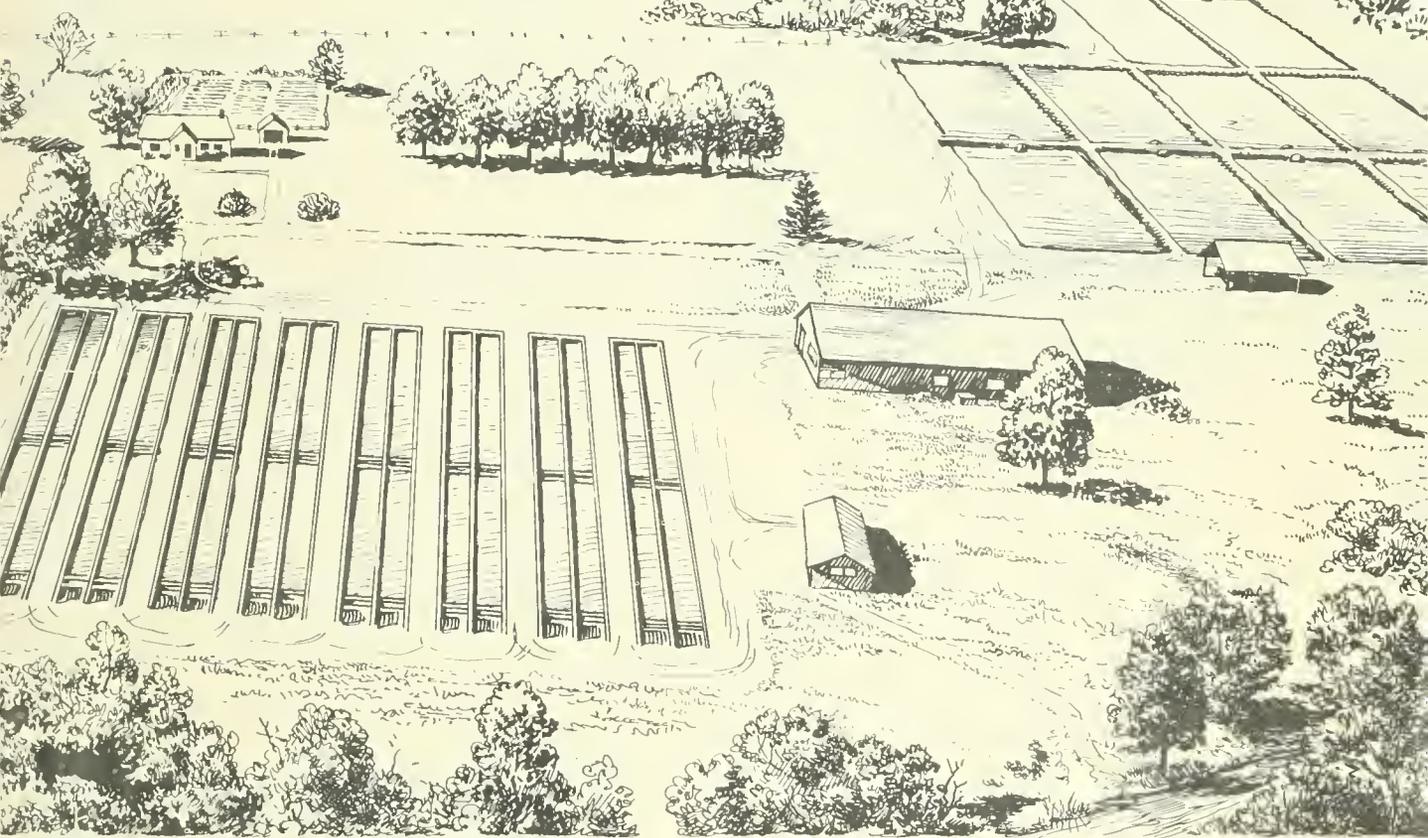
On the other hand, when we stock waters where a great many fishermen will fish for the trout as soon as they are planted, we hold and feed the trout here until they are 6 to 9 inches long—or of legal size according to the regulations of the State in whose waters they are to be planted. Naturally,



UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
CIRCULAR 28



A Visit to a Federal Fish Hatchery

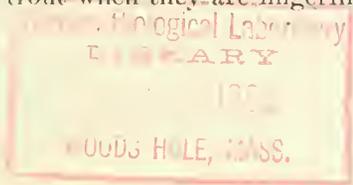


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5 inches long. We plant them as fingerlings if it is likely to be some little time before fishermen will catch them, and if they will have a chance to feed on plenty of insects, insect eggs and larvae, and smaller fish or worms.

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UNITED STATES DEPARTMENT OF THE INTERIOR
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CIRCULAR 28





A TROUT RACEWAY

the larger the trout must be for legal fishing, the longer we must hold and feed them. It takes at least a year to raise legal-size rainbows here, and most of the Federal hatcheries now have to hold and feed greater numbers of trout to legal size.

Over here is one of the raceways containing rainbow trout. While we wait for the feed to be brought from the hatchery, let's take a look at this raceway. It's about 80 feet long, 8 feet wide, and 3 feet deep, and has a sloping floor. Since trout like cold water, with temperatures between 45° and 60° F., and a fast current, spring water is brought through an intake pipe and passed out through an outlet pipe in a flow that would fill the raceway twice in an hour. When we want to remove some fish or to clean a part of the raceway, we send less water into the raceway and then the fish gather in the shallower end where the water enters. The raceway is made of concrete to save our trout from crayfish, snakes, rats, and other predators. Concrete also makes it easier to scrub the raceway and keep the water clean and sanitary.

Trout need constant care; disease can cause great losses very quickly. Keeping the raceways clean is only part of the job. From the time we take the eggs to the time we plant the fish, we constantly disinfect, give drugs to prevent or cure

illnesses, feed diets to produce strong and vigorous fish, and separate healthy fish from unhealthy fish.

As you can see, the food these trout are busily snapping up is being squeezed out of a ricer much like the ricer used at home for potatoes. When these trout were first put here as 2-inch fingerlings, we used a ricer with much smaller holes.

We distribute the strings of food over this feeding area so that all the trout can get a fair share. Uneaten food is wasted and must be removed before it spoils. Aside from causing added work in cleaning the raceway, wasted food is an actual loss to the hatchery. The diet for these large trout is a mixture of dry meals and meat products. It contains the amounts of proteins and vitamins that are needed to make the fish grow fast and to keep them strong and healthy.

Some of these trout will be held as brood or parent fish for the next season.

Let's go into the hatchery building now, and see how the new crop is started. The small rooms contain our foods and the meat freezer. We thaw large pieces of frozen meat, grind them, and mix whatever dry food the diet may require. To avoid loss of food values, we make up only one day's feeding at a time.

Probably you have watched egg-laying fish in your home or school aquariums. There, ripe males

MIXING FOOD





COMBINING EGGS AND MILT



TROUT EGGS

and females—fish ready to spawn—simply drop their milt and eggs together in the water. Here we *strip* the ripe trout, that is, we take their eggs and milt. Our spawntaker holds a ripe female with the tail pointing downward over a moistened pan, and gently presses the fish's belly with thumb and forefinger until the eggs flow from the fish's vent into the pan. A female trout may have several thousand eggs. After stripping several females, the spawntaker selects a male and presses it until enough milt has been deposited in the pan to fertilize the eggs. Then he stirs the eggs and milt, adds a little water, shakes the pan gently, and sets it aside for a short time to let the milt fertilize them. Finally the spawntaker washes off the excess milt and puts the mass of eggs in water to harden.

As soon as the eggs are water-hardened—that's when they separate—we measure and count them, and put them on wire-bottomed wooden trays. We place these trays in the running water of the troughs that you see here. We try not to disturb the eggs until we see the small spots that will later be the eyes of the fish. Then, because the eyed eggs are less delicate, we can pick out any dead (white) eggs that may be in the trays. If the water temperature is around 45° F., rainbow-trout eggs usually hatch in about 45 days and brown-trout eggs in about 63 days.

Newly hatched fish are known as fry. Last spring a very young visitor remarked that what came from the egg looked more like a small gumbdrop with a head and a tail than it did like a fish. What he called a gumbdrop was the yolk sac which is the fry's supply of food. As the fry gets older, this sac becomes longer and slimmer until it dis-

appears, and we have a young fish that can use its fins and tail to swim about freely.

For some weeks after hatching, a fry stays near the bottom of the tray, held down by the weight of its yolk sac. As the yolk sac gets smaller, the fry becomes lighter in weight—and hungry—and rises in the water. In a very short time all the fry learn to feed on a daily ration of beef liver or heart ground very fine and put through a hand ricer with small holes. As the fry grow larger, we supply this meat in larger pieces. When the young fish have grown to fingerling size, perhaps 2 inches long, we move them to the raceways and start feeding them a less expensive diet of mixed dry foods and meat products.

Salmon? No, we don't have them here. Most of the Federal hatcheries that have salmon are on the West Coast, especially in the Columbia River Basin of Washington and Oregon. You see, the several species of Pacific salmon hatch in streams that have coastal outlets. They migrate down these streams to the ocean, where they spend a year or more before returning to inland waters to spawn and die.

If you should visit a salmon hatchery, you would find that it uses cold water, holds its fish in troughs and raceways, and feeds a carefully prepared diet. The big difference between trout and salmon hatcheries is that trout may be used as brood or parent fish for several seasons, whereas ripe Pacific salmon are killed for stripping of eggs and milt since, even when free in the streams, they all die after spawning. So few salmon are able to spawn in the wild nowadays that taking eggs and milt is the only way to be sure that the eggs will have a chance to hatch, or that the fry

and fingerlings will have a chance to grow and reach the ocean, and later return to the spawning grounds.

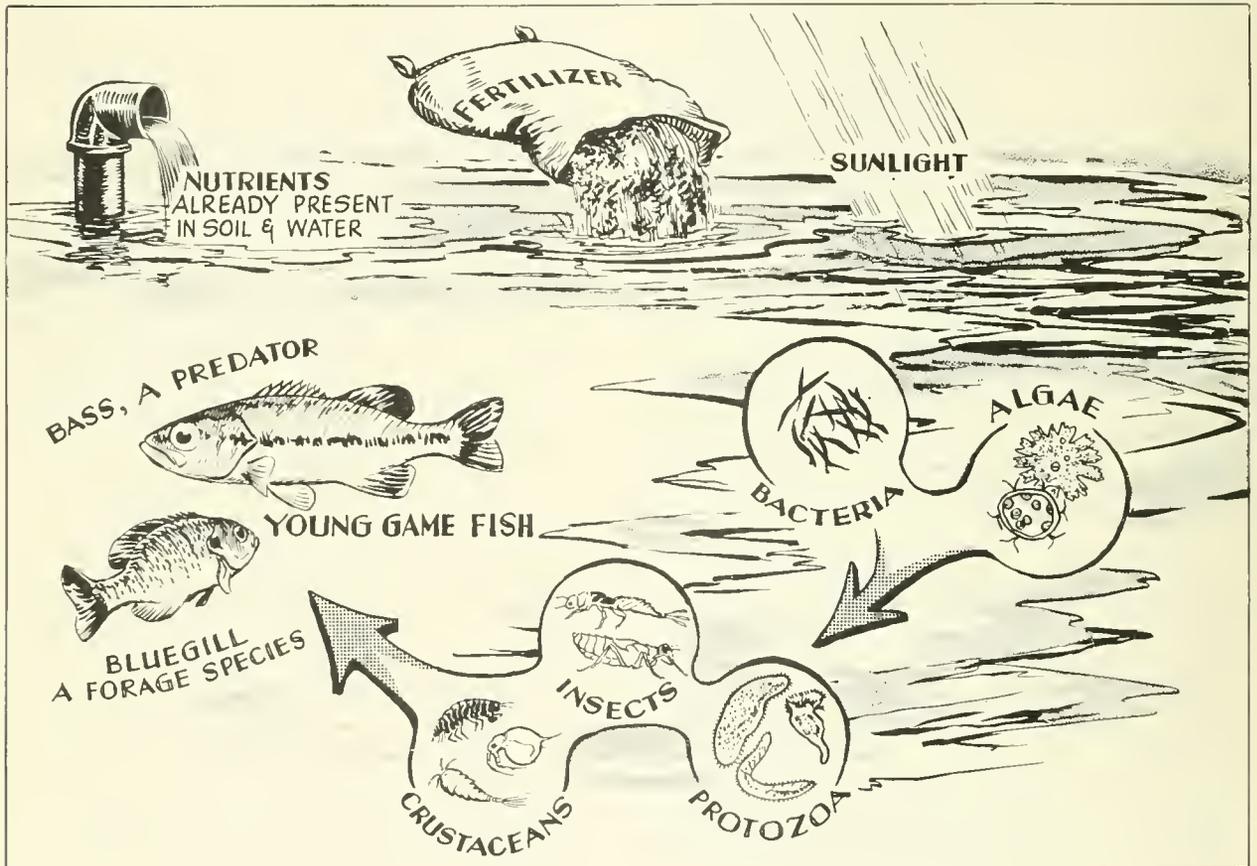
In addition to raising cold-water fish for stocking, Federal hatcheries also raise warm-water fish. Let's go over and visit the warm-water ponds. Watch your step as we go out on the dikes between the ponds. If you should fall in, you wouldn't find the water very cold. These 1-acre earthen ponds have water with temperatures between 50° and 90° F. most of the year. We let in only enough water to keep the ponds as deep as we want them. At the deepest end the water is generally 6 feet, and at the shallowest end it is 2 to 2¼ feet, with intermediate depths in between.

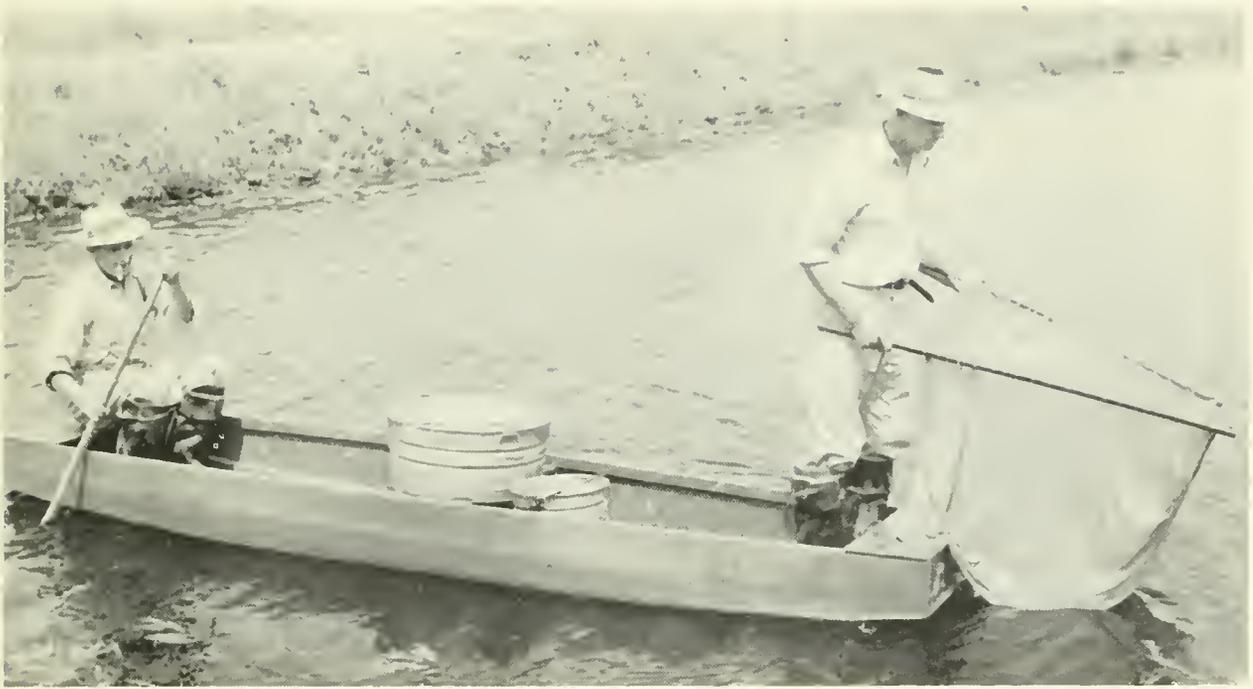
Our black bass, bluegills, channel catfish, crappie, redear sunfish, and other warm-water fishes get most of their food from the ponds. This food is a series of living forms, a chain in which each link is a plant or animal form that supports another, higher form. In these ponds, the com-

bination of rich earth, water, sun, and air produces great numbers of plants that are so small they can be seen only with a microscope. These tiny plants are the food of the very small animals. The small plants and animals are the food of insects and newly hatched fish. And all are food for larger insects and small fish like bluegills and other sunfishes. Finally, these small fish are the preferred food of the large bass, crappie, and catfish. Weeks before the nesting season begins, we put fertilizer (manure or various chemicals) into the ponds to assure a good growth of the tiny plants that are the first link in the food chain.

Here is a pond full of bluegills, including adults (large fish), fingerlings, and fry. When the water temperature is almost 70° F., we put 60 to 100 adults into a pond like this. On the bottom, the male bluegills brush out nests. They build these nests in groups or colonies, and each male protects his own nest from intruders. When the water gets a little warmer, the fish spawn over these nests.

A FISH FOOD CHAIN





SEINING BASS FRY

The warmer the water, the sooner the eggs hatch. For perhaps a week, the fry stay in the nests, feeding on their yolk sacs. When that food is gone, the fry leave the nests and start feeding on small plants and insects.

If you had been here yesterday, you might have watched us draw a seine or net through this pond and take out a number of 1-inch fingerlings. We do this often, since the bluegills keep on spawning until the end of summer if they don't become too crowded. In one season, each of these 1-acre ponds ordinarily yields 100,000 or more fingerlings of the size (1 to 1½ inches long) for stocking. When this pond is drained at the end of the season, the bluegills for next year's brood fish are put into a smaller, heavily fertilized pond for the winter.

Come on over to this rearing pond for large-mouth bass, and look at a less sociable fish. This pond is only 2 to 4½ feet deep, and you can see that it contains only bass fingerlings that are all about the same size. A bass eats only living moving food—even if it's another bass. Since this is so, a pond that is to be stocked with bass fry is always heavily fertilized so that it will have a good crop of small plants and insects for the fry to eat; and since a hungry young bass often tries

to eat any smaller bass, we put only fry of uniform size into a pond. We drain a pond as soon as we see any unusually large fish. If we didn't do this we should have a smaller number of larger fingerlings instead of a large number of small bass fingerlings to put into fishing waters.

Early in the spring we put 80 or more bass into a pond like the one in which the bluegills are now spawning. As the water temperature nears 60° F., the male bass pick out nesting sites at some distance from each other. A male may form a shallow saucerlike nest with his tail, or he may just select an area near some roots or small sticks. He vigorously defends his nest site from would-be intruders. Spawning begins when the water is 65° to 75° F. A male gets a ripe female over his nest and spawns with her. When she stops dropping eggs, he drives her away; his nest may produce from 1,200 to 15,000 fry.

The male stays over his nest, guarding the eggs, which generally hatch in 4 to 10 days. Held down at first by their yolk sacs, the fry generally become lighter and rise in a group or school to the top of the water. Until the fry are very active, the watchful male keeps them together in this school. Before the school breaks up, we go out in a small

boat and seine up the fry. It would be very hard to collect such small fish— $\frac{1}{2}$ to $\frac{5}{8}$ inch long—after they scatter to look for food, and many of them would be eaten by larger bass. Many of our bass are planted as 1-inch fingerlings, so we usually stock holding ponds with 40,000 to 60,000 fry to the acre, and distribute the young fish about 2 weeks later. If we are to plant larger bass, we put smaller numbers of fry into rearing ponds like this one, for a longer time.

What happens to the parent bass? When they are through spawning and the fry have been removed, the spawning pond is drained and the brood bass are moved to winter quarters—a heavily fertilized pond containing bluegills and other small fish that spawn in great numbers and provide the bass with food for the winter.

If you think of the last time you went bass fishing, you'll probably recall that the water also had a good number of smaller fish like bluegills or some other kind of sunfish. A water that makes for good bass fishing is one in which the food chain is working smoothly. The predators (bass) are living on the prey species (bluegills, for instance). The prey species have many more young than the bass. They spawn and grow so rapidly on plants and insect life that many escape the hungry bass to become adult fish and produce more young. The bass in turn keep the prey species from becoming

so numerous that they eat all the plant and insect life.

To get the ideal balance of all the foods that make for good fishing, we generally stock a fertilized pond with 100 largemouth black bass and 1,000 bluegills to the acre. If a pond is not fertilized, we usually cut those numbers in half. You can help to keep your favorite pond productive by fishing the bluegills or other panfish as well as the bass, and by removing undesirable fish like carp.

Don't dabble your fingers in this pond of channel catfish. They are young, but their fins have sharp spines. Instead of waiting to see these catfish fed their ration of ground fresh meat, let's visit the pond where the eggs for these fish were taken.

These pens of wood and mesh wire are about 6 feet wide, stretch about 12 feet from the pond bank, and extend about 1 foot above the water surface. They are set about 1 foot into the pond bottom so the catfish can't dig out. Catfish seem to like to nest in caves or under ledges, so at the beginning of the spawning season each pen has a 10-gallon can or jar set into the pond bank, 1 or 2 feet below the water surface, with the open end away from the bank.

For each pen we select a ripe pair, with a male larger than the female because he will protect the

CATFISH REARING PONDS. THE MAN AT THE RIGHT HAS A NESTING JAR.



eggs from intruders and will fan them with his tail and fins. The male's action keeps a continuous flow of fresh water over the eggs, and keeps silt from settling on them. When only one fish stays in the nest, we explore the nest with our hands to learn whether the eggs have been laid. The 2,000 to 8,000 eggs in a nest usually have eye-spots in about 5 days, and the fry may appear 3 or 4 days later. At this hatchery we move the fry at once to a small, carefully cleaned pond and start feeding a commercial food that has been put through a very fine food chopper.

Now let's go over to the fish-holding shed. We make up a delivery schedule early in the year, and we need a backlog of fish of various species to avoid a delay in loading the truck. This truck has oxygen and cooling equipment that makes it possible to deliver thousands of fish of all sizes in good condition for planting. To stock the holding shed, we take fish of suitable sizes

from the ponds whenever we can and then hold the fish in these tanks.

And that completes this visit to a fish hatchery. When you have an opportunity, visit some of the other Fish and Wildlife Service hatcheries. All these hatcheries work to raise greater numbers of healthy fish as cheaply as possible, and to stock them in waters that will feed and shelter fish until they are caught by fishermen.

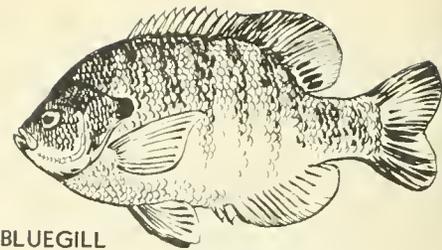
Each Federal hatchery is set up by a special act of Congress to serve a definite need in a particular section of the country. More than 17 million fishermen spent more than \$33 million for State fishing licenses alone in the year ending June 30, 1952. And some States do not require licenses for millions of other fishermen—veterans, women, and young anglers.

So when you are fishing, for free or with a license, remember that your Federal and State fish hatcheries help make this sport possible.

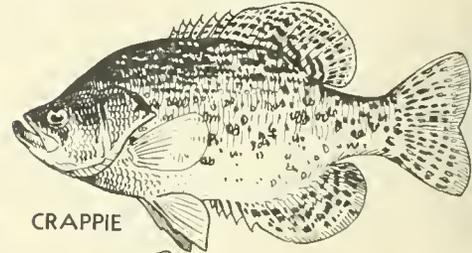
HATCHING TROUGHS FOR TROUT



Game and Food Fishes
Generally Raised at
Federal Fish Hatcheries



BLUEGILL



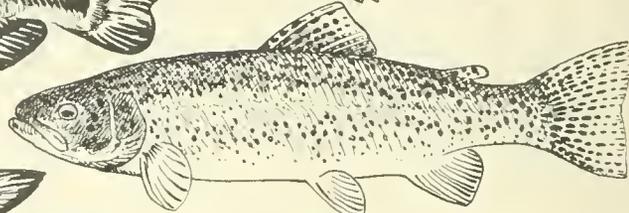
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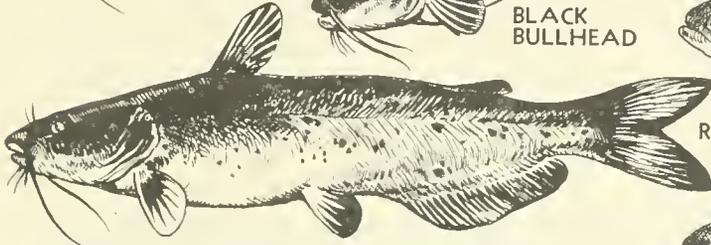
BROWN
BULLHEAD



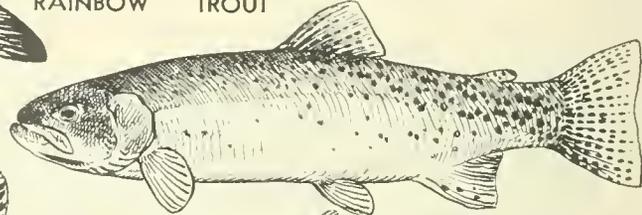
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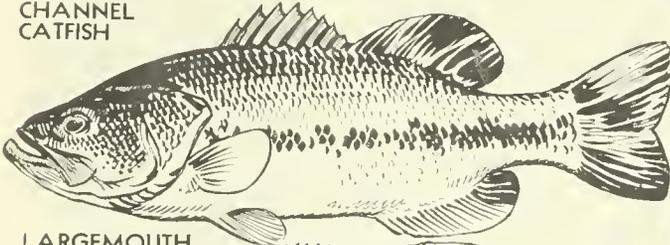
RAINBOW
TROUT



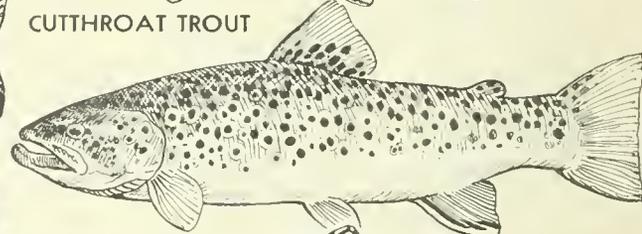
CHANNEL
CATFISH



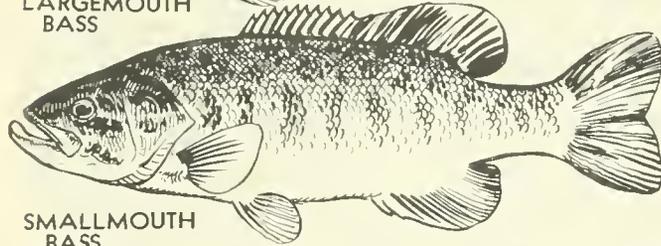
CUTTHROAT
TROUT



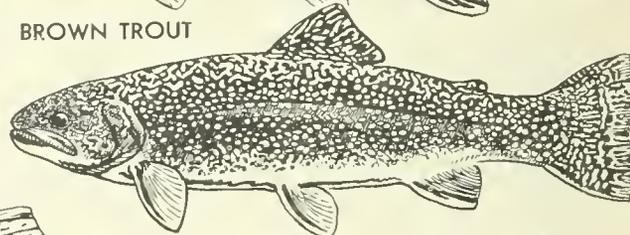
LARGEMOUTH
BASS



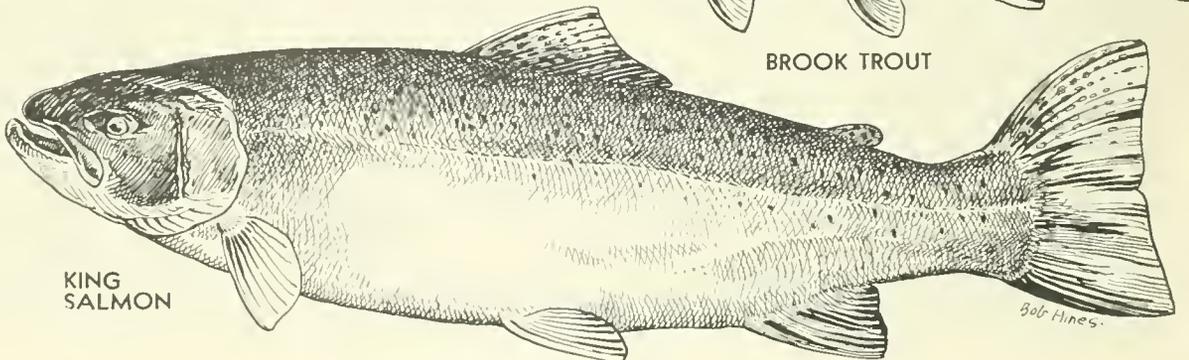
BROWN
TROUT



SMALLMOUTH
BASS



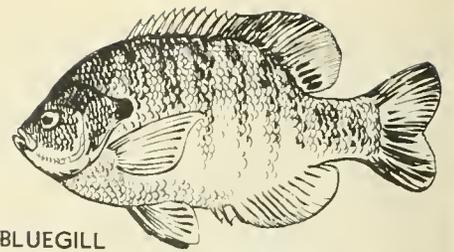
BROOK
TROUT



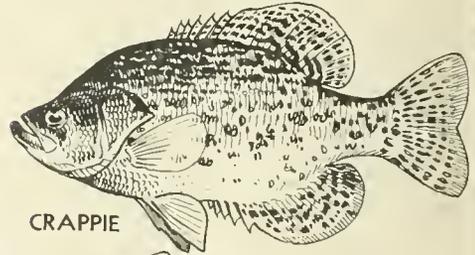
KING
SALMON

Bob Hines.

Game and Food Fishes
Generally Raised at
Federal Fish Hatcheries



BLUEGILL



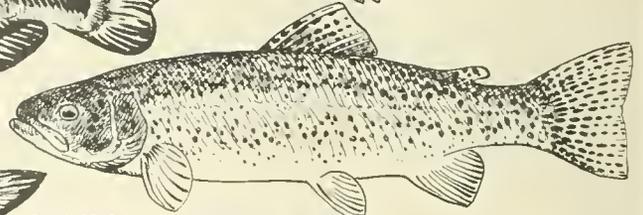
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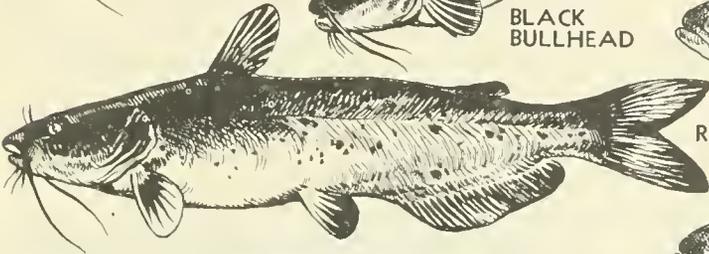
BROWN
BULLHEAD



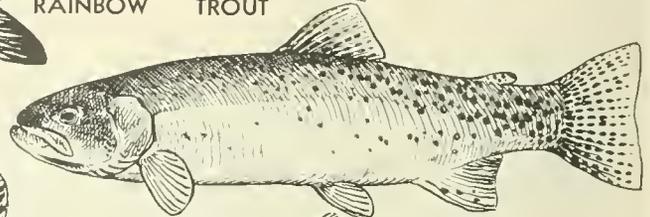
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BULLHEAD



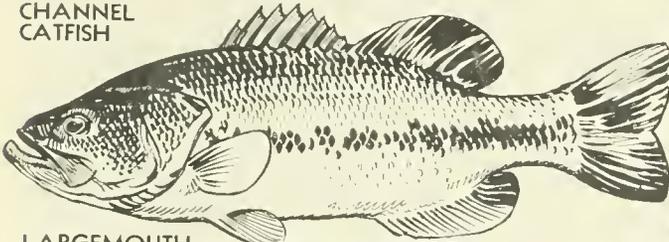
RAINBOW
TROUT



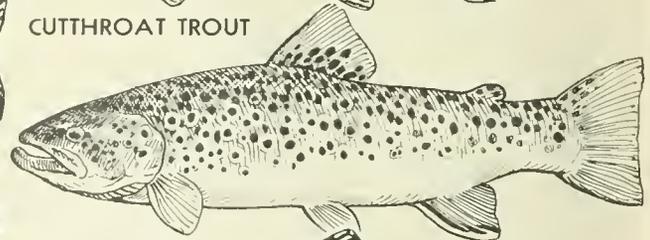
CHANNEL
CATFISH



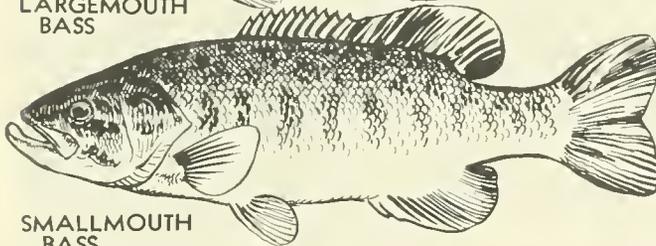
CUTTHROAT
TROUT



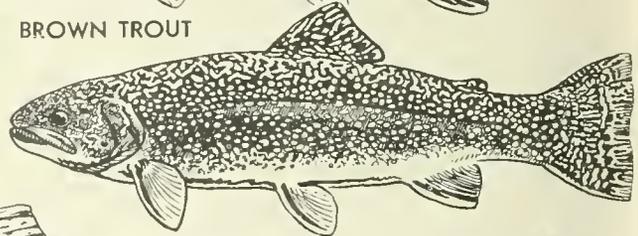
LARGEMOUTH
BASS



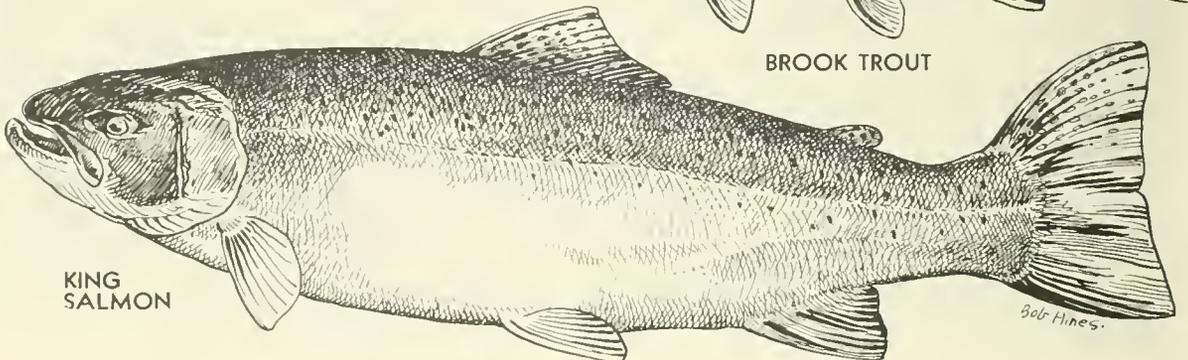
BROWN
TROUT



SMALLMOUTH
BASS



BROOK
TROUT



KING
SALMON

Bob Hines.