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11.—THE SELECTION OF SITES AND THE CONSTRUCTION OF CARP PONDS.

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The cultivation of carp or other fish in ponds is attended with success only after requisite preparation in the first place, followed up by a reasonable amount of care and watchfulness.

I very greatly fear that the majority of fish-ponds are improperly located or improperly built. Upon the water and soil depend the ratio of growth.

SITES FOR CARP PONDS.—This is one of the best watered sections in the world, possessing small and large streams in every quarter. The extensive flat alluvial or made lands which lie along the creeks are the places for the best-paying ponds, such places as make the best corn, but there are very few persons in North Carolina who are justified in going into pond-building on a large scale this year. They have no means of stocking such large ponds until the fish first distributed have spawned.

A large number of ponds which will be built during the next twelve months will be small, and used ultimately for breeding or hatching purposes, and I take this occasion to call attention to the various localities which offer advantages for these and larger ponds. The most valuable ponds for growing carp will be on creeks, but these are the most costly and the most difficult to maintain.

Casting about for the most advantageous point to construct a pond, it will be observed that there are five classes naturally presented. With these in mind, I believe there are many persons who, having despaired of finding a proper place on their lands, will, after further search, discover all necessary conditions for making as good ponds as they wish.

I. NEAR THE SOURCE OF SPRINGS.—Ponds of this class will always be in favor. The advantages are, slight liability to overflow and close proximity to dwellings. They are more often visited, the fish are more easily protected against birds and snakes and can be domesticated more quickly; but the coldness of the water produces a comparatively slow growth. Such ponds are useful for hatching purposes, but the area is generally too small for the extended growing of fish, except when high dams are built, and these are risky. Besides, there is generally but a small area of rich soil at spring heads, and consequently a scarcity of insect life. Hill-side ditches, made chiefly with the plow, will suffi-

ciently protect them from overflow, but it is advantageous to allow a safe amount of washing to pass into them.

II. ON THE BEDS OF BRANCHES OR CREEKS.—Ponds made on the beds of branches and creeks will constitute a larger number than any other class. They will prove most valuable for growing carp, but will require much care in the construction of the dam and the overflow. They will not attain to the highest value unless the inflow and outflow of water is screened. Every one who has tried can estimate to some degree the trouble this involves. Whenever it rains the volume is so increased that it is nearly impossible to strain it through screens.

The only way to control it absolutely is to go above the head of the pond and cut a wide, shallow ditch around the side of the pond and turn the freshets. This will be impracticable in many ponds, but in some cases where plows can be used it can be done with a moderate outlay.

III. ON MEADOW-FLATS.—Ponds built on meadow-flats by the side of branches or creeks can be made entirely safe from freshets. I greatly favor this as well as the following class: On many streams where it would be impossible to build manageable ponds of Class II, large areas of comparatively level land are found which would make excellent ponds. Ponds of this kind would have a dam or dike running down the side of the stream and, turning at right angles from it, run to the hill-side. Now, to get water into this pond, you have to go up the stream until you get 4 or 5 feet of fall. When this point is found, obstruct the run with a log or some piling and cut a ditch along the hill-side with very slight fall (1 inch to 20 feet), running the water nearly level. By the time you get down to the head of the pond you are some distance up on the hill-side, away from the old run. If the stream is flat and the fall insufficient to answer this purpose, it may be practicable to make the obstruction above a tumbling dam, 2 or 3 feet high, by using more logs and piling. The sand filling in behind will make no difference, as the dam is put there for the sole purpose of giving you that much more fall to supply the pond below. With a pond of this kind (and they may often be made) there is no danger of overflow at any time. The supply ditch, made chiefly with a plow, will only convey a given amount of water to the pond, and the rest will fall over your log obstruction or tumbling dam and pass down the creek. The long dam extending alongside the stream should not be built too close to the old run, as craw-fish will work under it and high water may cut it away. It should be quickly set in cane or Bermuda grass.

IV. BY THE SIDE OF MILL-RACES.—By the side (on the lower side) of mill-races, frequently occur sites well adapted to the construction of fish-ponds. Such races are quite common in the middle and western counties, and they often reach a long distance. On the lower side, between the race and the old bed of the stream, level or comparatively level tracts of land from one to four acres in extent are often found.

Dams thrown up here are safe from overflow, and water can be let in from the race and the supply governed with precision. Both in this and the preceding class, the dams need not generally be very high, since they receive no freshets.

V. BELOW MILL-DAMS.—I have frequently observed level tracts of land on which good fish-ponds could be made. Generally, in such places, it will be necessary to run a dam parallel with the creek as far down as the pond is to extend, and then turn at right angles to the hill-side with another section of a dam, as in Class III. Dams of this class need not be very high, and the water supply can be taken through the dam of the mill-pond above. In the three classes last named, the area of land covered by the water will be alluvial as a rule, and suited exactly to the requirements of the fish. The advantage of requiring moderately low dams is a great item, because it is the vertical height of water that causes the majority of dams to break. As stated before, they will not overflow, and the amount of water received into them can be regulated and strained as it goes in and wastes out.

Most persons have a leading idea that all ponds must be made by throwing dams across streams. This is a great mistake, for many large ponds can be made on the three plans last named.

But the value of such ponds as are made by the side of streams, below canals and mill-dams, is apparent for other reasons than those just mentioned. The land covered by these being naturally dry beforehand, gives a firmer bottom to walk upon when the fish are being picked up, and in the course of three or four years, when a quantity of soft mud accumulates, destroying the productiveness of the pond, the water may be turned out, when the mud will dry enough to produce a crop of rice, German millet, or corn. One crop made on this soil will reconvert its latent properties into fish-producing substances, and render it as valuable as in the commencement.

It is important to have the drainage of the pond very deep. The draw-gate should be below the bottom of the pond proper, allowing, when desired, complete drying of the soil, which will then produce crops from the rich mud soil. With two feet fall a ditch may be cut from the upper end of the drainage box, and allow all the water to leach from the soil.

Being beyond the possibility of overflow, the dam need not reach more than 8 or 10 inches above the surface of the water. A dam which rises but slightly above the pond surface is less liable to attacks from musk-rats, for although these animals penetrate the face of dams beneath the water-level, they incline the passages upward, and enlarge them in the dam above the water as it stands in the pond. Besides, dams look better when built but a few inches above the water, though they can never be safe unless the inflow is controlled. Another economic point lies in the fact that you avoid large wasteways and extensive and costly screens.

CONSTRUCTION OF PONDS.—Many persons who depend upon a limited amount of water for a supply fail through poorly constructed dams to

hold enough to keep the pond full. Others, who have an abundant supply, usually receive into the ponds entirely too much when the rain-fall is great. The ponds which are in danger are those which receive the floods.

To secure the desired result, the food products of the water must be given up exclusively to the carp as the properties of the soil are given to the cotton plant. Therefore, when it is intended to construct a pond, there are several questions which should be determined beforehand.

EVAPORATION.—If the supply of water is small, too large a pond will expose so much surface in dry weather that the level of the water will be lowered by evaporation, and by filtration through the porous soil forming the basin. It is difficult to estimate this loss, but I do not believe that it would be safe to regard it as less than ¼ of an inch per day in dry, hot weather in shallow ponds. At this rate an acre pond would lose at such times 6,783 gallons per day, or 282.6 gallons per hour. In other words, if the loss by evaporation is approximately ¼ of an inch of the surface a day, it will require a constant supply of spring water, amounting to 282.6 gallons per hour, or 4.7 gallons per minute, to keep the pond full. Ponds half the size would lose but half as much. Rain-water must not be depended upon to supply fish-ponds.

MANAGEMENT OF OVERFLOW.—A carp pond to be of value must be arranged in a manner that all the water coming in and going out can be passed through screens. Labor and money invested in any attempt to pass the *floods from heavy rains* through screens may be regarded as thrown away. A volume of water a foot in diameter, running with the usual velocity of streams after rains, contains enough floating and suspended matter to fill several yards of screen in a few hours, and oftener in a few minutes. The earlier this is realized the better. If it is the purpose to build a large pond by building a dam across the stream, it will be best to cut a canal around the dam at the outset, through which the floods may pass without entering the pond at all. Such a canal should begin a few yards above the head of the pond. By using a level you can stand at the site of the dam and determine the upper beginning point before the dam is built. But it may also be determined after the water is raised, since the surface will indicate the line along the side of the pond above which the canal must extend. The fall in it should not exceed 1 inch in 20 feet, and if it passes close along the pond side, its bottom should not be lower than the water surface of the pond. To determine its required dimensions necessary to waste the floods, you must ascertain as nearly as possible the acreage of land which sheds rain-water into the basin or valley above. A rain-fall of 1 inch amounts to 3,628 cubic feet, or 27,138 gallons, to each acre. Ascertain the rain-fall of your region, in order to serve as a guide for making wasteways on dams and for regulating the size of canals around them. Note the extremes in the rain-fall, for it is the heavy rains that test the construction of ponds. The canal should be two or four times wider

than deep. The soil removed should be plowed up and shoveled to the lower or pond side. When the question of getting rid of the floods is disposed of, the dam may be built.

WASTEWAYS.—Many persons will not attempt to turn the floods around the dams by making canals, and therefore I would recommend that the wasteways to their dams should be cut around the end through the natural soil of the hill-side. This form of wasteway is merely a wide ditch, cut without fall, and extending far enough below the lower side of the dam to prevent the waste water from cutting that side of the dam away. Two or more rows of piling to arrest the cutting out may be required to be driven across this outlet, the upper ends being even with the bottom of the ditch. A row of narrow strips of boards may be driven in the mud close together in the pond above the mouth of this ditch to serve as a screen. If this screen or fence is located in 4 or 5 feet of water, and the two ends drawn in to the shore, it will be twice as valuable as if built immediately at the ditch mouth, for more surface would be exposed. The strips or stakes should be driven a foot into the soil below, and their upper ends on a level with the top of the dam. No dam, however small, should be built without a box in the bottom, provided with a gate, for drawing the water. Such a box should be made 6 or 10 inches square, of 2-inch plank, and reach entirely through the dam, and much pains must be observed to make it long enough. It should be well nailed together and be placed into the bottom of the dam at the lowest point. It should be placed upon one or more pieces of scantling laid in the soil at the base of the dam, and be nailed to these to prevent the water flowing under. The earth can be packed above and on the sides, the timbers being necessary only underneath. A gate should be put into the upper or pond end.

No dam should be made until a ditch has been cut along the line which it will occupy, and the light soil thrown out. Fresh earth put back into the ditch, well rammed, will prevent blowing out if the ditch is dug 2 or more feet. Ponds for raising the carp should be shallow, not more than from 2 to 4 feet deep, except at the dam, where there may be a depth of 5 or 6 feet.

12.—ON A SKIN PARASITE OF THE CUNNER (CTENOLABRUS ADSPERSUS).

By JOHN A. RYDER.

Shortly after my return from Wood's Holl, Mass., an interesting specimen of the common Cunner, Chogset, or Blue Perch, was sent on from that place by Vinal N. Edwards, to Washington, on account of the peculiar spotted and rough appearance presented by the skin. At first one might have supposed that the peculiar whitish spots, with a dark halo of pigment around each of them, were points where some minute fungus