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\* FISHERIES RECOMMENDATIONS FOR IOWA \*  
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\* BY \*  
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## THE OKOBOJI LAKES

These lakes are of course the finest in Iowa, especially West Okoboji. This is in fact one of the most delightful of the lakes in the Prairie states, but to rate it "by authority the third most beautiful inland body of water in the world" is of course a bit of provincial chauvanism. But these lakes are tremendously valuable to Iowa, and warrant all the thought, energy and money that can be found, to conserve and develop them.

The depth, coolness and purity of the water in West Okoboji is of great value and importance; but these very factors cut down its productivity. This lake can not be expected to produce per acre anything like the poundage of fish taken from shallower and dirtier lakes in the state.

Fluctuation in Level.—Reports indicate a great fluctuation in the level of the Okoboji lakes. We were told the East lake went nearly dry, except in the stream-boat channel, at the time of the World's Fair (1893).

Temperatures.—The average surface temperature for six stations ran from 22°C (=71.6°F) to 27°C (=80.7°F) from July 24 to September 11, 1931, indicating this as a very distinctly warm water lake.

Water.—The Okobojs are probably the clearest of Iowa lakes. In the West Lake, during the summer, one can see the bottom in 6 to 8 feet of water, while in most of the lakes about 2 feet is the limit of bottom visibility.

Oxygen conditions in East Okoboji Lake seem to remain generally in a satisfactory condition. This Hart found true even over the winter of 1931-32 (see his Graph IV). The value for D.O. fluctuated generally from 6 to 12 p.p.m. from July 24, 1931 to November 13, 1931; rose to 14 and 18 p.p.m. on December 4, presumably with a wave of plant plankton which then probably died, dropping the oxygen to low values (2 to 12 p.p.m.) in the latter part of January 1932. The pH of East Okoboji was found to vary from 7.8 to 9.0, except in midwinter of 1930-31. Then the value rose



to 9.4 when the oxygen was supersaturated (doubtless through plant action) on December 4, but dropped to 7.2 when the oxygen dropped to 5.0 p.p.m. on January 23 (doubtless on account of decomposing plankton).

As would be expected, Hart found the D.O. profile of West Okoboji to be nearly level. He characterizes the conditions in this lake to be the most uniform of any of the lakes studied. This applies not only to oxygen but also to other substances. "The pH is very uniform, although somewhat lower than is found in the remainder of our lakes",—A condition related to the moderate amount of algae and other plant life (pH was 8.4 to 8.6 on July 10).

The purity of the water in West Okoboji is famous—as contrasted with that of Iowa lakes in general.

Bottom.—The bottom of West Okoboji was called sterile by Mr. Hart, by which we suppose he meant it wasn't a septic bottom like most Iowa lake bottoms.

Vegetation.—Weed beds are in general deficient in the two Okoboji lakes (not including several bays or the smaller lakes of the chain). Salyer got the impression that perhaps 95% of the original vegetation in East Okoboji Lake had been removed. Reports indicate that there was once a good stand of rushes in this lake, and even cane brakes (Phragmites) in its northern part. In 1932 the vegetation seemed to be showing some recovery, according to Mr. Marnette, who lays this to carp control work.

Hart reported that the principal weedy area in this lake is to be found from Highway 9 (leading east from Spirit Lake), northward in the lake proper as far as Peppermint Point. Plants found here he identified as Ceratophyllum demersum, Potamogeton natans, P. pectinatus, P. amplifolius and Nitella. "The remainder of the lake is quite barren. An attempt was made by the Spirit Lake Chapter 7 of the Dilg League to start some sedge at the narrows. The plantings were destroyed by cattle wadding in this portion of the lake. Consequently no benefit was derived.



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In West Okoboji Hart reported the principal areas of vegetation to be Miller's, Emerson's, Smith's and Hayward's bays, and he listed the plants found in each. He found one bed of sedges (Carex filiformis) north of Gull Point.

Algae.—It is generally regarded that algae became more or less obnoxious in East Okoboji Lake but not in the West Lake. Mr. Marquette insisted however, that six years ago (this is, 1926), "West Okoboji had a bad dose of blue-greens".

Natural Food.—Crayfish, snails and clams are said by Mr. Marnette to be disappearing from West Okoboji and to have disappeared from East Okoboji.

A considerable amount of food develops under the boulders and stones near shore. In West Okoboji, in relation to its cleaner nature, these organisms, according to Hart, are nest insect larvae, whereas in the "East lake, leeches seem to be the predominant forms to be found under the rocks".

A considerable snail population exists in West Okoboji. This was the only lake where Hart found any operculate snails (a Campeloma). Physa was found most abundant, while Planorbis was seldom taken. The snails are valuable food organisms, especially for sunfish. Hart mentioned that sunfish taken in Emerson's Bay, West Okoboji, in June, 1931, had been feeding solely on snails.

Spawning Grounds.—The weedy bays of West Okotobji Lake provide spawning conditions for most of the lake fishes, and are among its most valuable assets.

We presume, from hydrographic conditions, that Mr. Marnette is right in assuming that all fish spawn about two weeks later in West Okoboji Lake than in the East lake or Spirit Lake. He stated, for 1932, that bass were making nests in Miller's Bay of the West lake on July 1, when they were through nesting in the northeastern bay of Spirit Lake.

#### Game Fish

Wall-eyed Pike.—The wall-eyed pike are among the finest game fish of the state, and they are said to reach their largest size in the Okoboji lakes.

There is a question as to whether the Okoboji lakes are not being overstocked with wall-eyes. Mr. Marnette thinks this is true of the West lake, where he thinks



they are threatening the perch.

Northern Pike.--Occasionally caught in the main lakes, though apparently commoner in the "East Chain" than in West Okoboji.

Mr. Hart mentioned a report that an 11 pound muskallunge had been caught in West Okoboji in 1931. Not having seen the fish himself, Hart rightly doubted the record. It is a common habit of anglers to call large northern pike "muskallunge".

Bass.--Small-mouth bass have been taken by state crews fishing for pike on Pillsbury Reef of West Okoboji. Mr. Hart reports that a few were caught in 1932, as a result of the 1931 planting. Mr. Marnette agrees on this point, but claims he caught a large small-mouth bass in East Okoboji Lake 17 years ago. The conditions for small mouth bass in West Okoboji Lake, especially about the boundary reefs, seem excellent.

Mr. Hart characterized West Okoboji as one of the two outstanding lakes in the state for large-mouth bass fishing. "Miller's Bay, in West Okoboji, is virtually an angler's paradise when it comes to fall bass fishing. Many are taken each year".

The one large-mouth bass examined for food contained two 2 1/2-inch perch. Considering the growing scarcity of forage fishes, this will likely be found to be a frequent situation.

Silver Bass (Lepibema chrysops).--This species occurs in both Okoboji lakes. Hart remarked that "this fish is highly prized and affords a great deal of sport, especially at the draw bridge between East and West Okoboji. People can be seen fishing for Silver Bass there each evening between 6 o'clock and sun down all during the summer months. They are fine flavored, take minnows, and give lots of fight. They strike hard and invariably hook themselves so securely they can be landed. This makes them an ideal fish to catch".

Perch.--Perch are fairly common and reach a good size in this lakes. Hart estimated that more perch were caught in the Okoboji lakes than of all other species combined.

We found, as did Hart, a heavy infestation with the external parasite Argulus.



shrimp (amphipods) 1%; corixid (trace); total 3 cc.

which flakes off scales exposing raw blotches to further infections. On July 25 about two dozen perch killed by this disease were found lodged in a weed bed.

One perch examined, 7 1/2 inches long, had the following food:--in stomach one bluegill (50%) and corixids (1 cc. = 50%); in intestine only corixids 1.5 cc.

Rock Bass.--Scarce now. Hart regards the species as very nearly extinct, as very few have been caught during the last two summers. We would not regard the loss of this species as very serious.

Crappies, Bluegills and Sunfish.--These lakes are among the best in the state for these fine panfish. Hart reported that nearly all the crappies in West Okoboji are black crappies, while nearly all those in East Okoboji are white crappies.

Pumpkinseed and green sunfishes are said to occur in the West Lake.

We found young bluegills to be the most abundant small fish in these lakes. They consequently enter extensively into the food of the larger fish.

The bluegills in West Okoboji according to Marnette and others are badly infested with round worms, causing heavy mortality. Marnette's estimate of a 60% mortality under the ice over last winter (1931-1932) was baseless and presumably exaggerated.

To obtain some data on the food of the forage fishes in the Okoboji lakes we made some food studies, indicated below. The fish were caught in the latter half of July. The 3 largest bluegills and the pumpkinseed were caught in Little Miller's

Bay:

6 3/4 -inch black crappie: stomach empty; intestine with snails (2 cc = 100%).

6 1/2-inch black crappie female: one 1 1/2-inch bluegill.

8 1/4-inch white crappie: young fish fry 50%; midge larvae 50%; total 3.5 cc.

7 7/8-inch white crappie: small bluegills (33 = 100%).

7 7/8-inch white crappie: one 2-inch bluegill and 1 cc. of corixids (possibly from bluegill's stomach).

7 7/8-inch white crappie: midge larvae (2 cc = 100%).

7 7/8-inch white crappie: midge and corethra larvae 70%; tubificid worms 15%;



"shrimp" (amphipods) 15%; corixid (=trace); total 3 cc.

6 1/2-inch bluegill: mayflies 60%; "shrimps" 35%; one snail 5%.

6-inch bluegill: caddis larvae 80%; corixids 15%; "shrimp" 5%.

6-inch bluegill: caddis larvae 40%; corixids 35%; caddis larvae 25%.

4 1/2-inch bluegill: in stomach on mayfly larvae; in intestine only zygopteran nymphs; total 3 cc.

4 3/8-inch bluegill: in stomach water beetle larvae 55%, three "shrimp" 35%.

one small snail 10%; in intestine, remains of water-lily beetles.

7-inch pumpkinseed: mayflies 50%; "shrimp" 50%.

Catfish.--Hart wrote that a good many yellow catfish (whatever species that might be) occurred in these lakes, because several were caught each year in the pike nets (though few were taken on hook). Mr. Marnette calls them "blue cats".

All three species of bullheads are reported for both lakes, but there seems to be some confusion as to the species. The ordinary "yellow-belly" is not the yellow bullhead (*A. natalis*), but only the yellow phase of the black bullhead (*A. melas*).

Eleven bullheads (All *A. melas*), between 6 and 7 inches long, were examined as to food. It is clear that they feed largely on the same food as bluegills and other panfish, and occasionally eat young bluegills:

sh	Total food (cc)	Food Item									
		Bluegills	Pondweed	Snails	Pisidium	Insect remains =scuds	"Shrimp"	Midges	Caddis	Mayflies	Dam- sel flies
1.5	-	-	-	50%	-	50%	-	-	-	-	-
1.0	-	-	-	-	-	-	x	x	x	-	-
2.0	-	-	-	25%	-	-	-	-	few	25%	50%
-	two*	-	-	x	-	-	-	-	-	x	x
1.0	-	-	-	x	-	-	-	-	-	x	-
3.0	one*	-	-	-	x	-	x	-	x	x	-
-	-	wad	-	-	-	traces	-	-	-	-	-
-	-	-	-	-	30%	-	30%	-	-	40%	-
-	-	-	-	-	-	-	50%	-	-	50%	-
-	-	-	-	-	-	-	-	-	-	80%	20%
1.5	-	-	-	-	-	-	-	-	-	50%	-
2.0	-	-	-	50%	-	-	-	-	-	-	-

\*3/4-inch bluegills, not included in the volume of food as given.

Sheephead--Considerable doubt exists as to whether sheephead in the Choptank



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Coarse Fish.—Mr. Harry Tennant of Arnold's Park reported that he took carp in East Okoboji for the first time in the fall of 1908. Next year he took 200 pounds; the third year 800 pounds. This year (1932), Mr. Baur estimates the removal of 150,000 pounds from East Okoboji.

Marnette claims that carp spawn late in West Okoboji L. On July 27, 1932, he claimed the carp were spawning there only the previous week.

Reports have it that in early years buffalo were excessively abundant in the Okoboji lakes, so much so that they were taken with clubs, pitchforks and any other available weapons. They reached a large size: records of Mr. Tennant are 40 lbs. for the large-mouth buffalo (M. cyprinella), 64 lbs. for the black buffalo (I. niger) and 51 lbs. for the small-mouth buffalo (I. bubalus). The last named was taken 5 years ago, the last year of gill-netting.

We heard the usual claims of dishonesty, inefficiency and insincerity in the rough fish removal from the Okoboji lakes. This revolved itself largely into allegations that the Department granted contracts only to a clique, without reference to the highest bidder, and that this clique was much more concerned in maintaining the business than in removing the rough fish, quitting operations when markets were flooded or to allow a good brood stock to continue the stock.

Mr. Marnette claimed he made a "spot-seining" demonstration in East Lake at the Narrows and at Peppermint Point, taking 30000 pounds of carp and only 2 bluegills and 1 pickerel. The experiments were continued from June 15 to July 16, 1930, yielded a total catch estimated at 119,000 pounds and were sponsored by the Spirit Lake Chapter of the Dilg League.

Harry Hart in his report wrote about "Carpoides, Carp suckers" uprooting "literally tons of water plants" in Miller's Bay. But he seems to have mixed up these rather small, native buffalo-like suckers with the true carps (Cyprinus carpio). Salyer did obtain a carp sucker in East Okoboji, however; the species was Carpoides cyprinus.

Sheepshead:—Considerable doubt exists as to whether sheepshead in the Okobojis



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should be classed as a game or as a coarse fish. This species here attains a relatively huge size (up to 18 pounds), and often reaches 5 to 6 pounds, is not excessively thick and is reputed to be quite gamey on the hook. Their flesh is preferred by some, during the summer months, especially. Mr. Hart wrote that in the Okobojis certain fishermen will fish for no other kinds. Mr. Marnette gave his opinion that the small sheepshead of East Lake are so numerous as to seriously deplete the food supply.

Paddlefish.—This rarity in inland lakes has been occasionally taken in the Okobojis, of huge size. They were like stragglers from the Missouri (through the Sioux), which got into these lakes as young fish and then lived to a very old age. One of 168 pounds, it is reported, was speared through the ice of West Okoboji by Charles Wilson of Arnold's Park in the winter of either 1924 or 1932. About 1916 or 1917 Harry Tennant while commercially seining in East Okoboji took one of 113 pounds and one of 146 pounds. (Mr. Hardman gave weights of paddlefish of 185 and 220 pounds as being speared 15 years ago.)

Goldeyes.—Mr. Marnette reports "mooneyes" for all the lakes of the Okoboji group. These are presumably goldeyes (Amphiodon alosoides), which like eel and paddlefish have occasionally worked their way up from the Missouri (see also Larrabee's report 1917).

Obnoxious Fish.—Gars occur in East Okoboji, and are said by Warden Hardman to have always been there. Both species (long-nose and short-nose) occur, in both lakes. They are reported to be very common and to be a nuisance.

Eel.—Eels are a great novelty in the Okobojis, but are occasionally caught, which Warden Butler has a 47" mounted specimen in his possession, which was caught 4 or 5 years ago in East Okoboji ("on the hind leg of a gopher").

Forage Fishes.—Mr. Hart reported "in seine hauls made in East Okoboji, there were very few [minnows] and these were represented by about one or two species. Low water would be responsible for the dearth of minnows [how?]. As this supply has been the only source of supply, with the present amount of game fish to be found in all of these lakes, there is an ever present drain on these forms".



DUNNING SPRING CREEK

Winneshiek County

Examined by Hubbs, August 8, 1932.

This little tributary of the Upper Iowa, at Decorah, is not more than one-fourth mile long. It is fed by Dunning Spring, which has a flow of about cu. ft./sec.

A side draw carries in much flood water after rains.

This swift little stream is very cold ( $9.2^{\circ}\text{C} = 42.6^{\circ}\text{F}$  at the spring, and

$10.2^{\circ}\text{C} = 44^{\circ}\text{F}$  at bridge just above mouth of creek). It could thus be dammed with-

out danger of overwarming. The amount of flood water, location of road, etc.,

would argue against installing a large dam, but a series of well constructed stone

dams would make fine holding basins, capable of supporting perhaps 200 adult trout,

or perhaps 1,000 fingerlings.

This is a very small project, but development here would be much appreciated,

as the stream is at the edge of Decorah. It might be put on the docket for future

state action, or for recommendation to the land owner.

Width.--5 to 8 ft. below upper springs; 12 to 15 ft. below Park.

Depth.--4 to 6 inches below upper springs; 6 inches below Park.

Discharge.--1 to 3 million gallons per day.

Bottom.--Clean in upper course; muddy below Park.

Shade.--Well shaded by bluff and trees toward head; atmosphere very humid here; more open and sunnier in lower course.

Vegetation.--Much moss (*Festucalia*) and algae (*Cladophora*) just below upper springs; grass at frequent intervals; a little farther down.

Natural Food.--Many caddis below upper springs.

Recommendations

Stocking.--The stream should be heavily stocked with legal sized trout at numerous intervals through the fishing season.

Improvements.--The stream should be made a succession of dams and ponds (holding basins).



These recommendations would only apply to the section below the Bearing Station,  
if the latter is constructed.

TWIN SPRINGS CREEK

Winneshiek County

Examined by Salyer on July 7, and by Hubbs on August 9, 1932.

Tributary to---Upper Iowa River (in Decorah).

Water Supply---Normally all spring fed (see Report on Hatchery Sites).

Considerably flooded in spring from dry wash.

Pollution---None

Dam---None

Shore---High limestone bluff on south side in upper part; flat valley on north side above and on both sides below.

Temperature---Cold (see Report on Hatchery Sites).

Water---Very clear, not easily roiled. Oxygen: 6.1 pp.m. at springs to 8.5.

Current---2.2 ft./sec. below upper springs

Length---About 1 mile by stream.

Width---5 to 8 ft. below upper springs; 12 to 15 ft. below Park.

Depth---4 to 6 inches below upper springs; 6 inches below Park.

Discharge---1 to 3 million gallons per day.

Bottom---Clean in upper course; muddier below Park.

Shade---Well shaded by bluff and trees toward head; atmosphere very humid here; more open and sunnier in lower course.

Vegetation---Much moss (Fontinalis) and algae (Cladophora) just below upper springs; cress at frequent intervals; a little farther down.

Natural Food---Many caddis below upper springs.

Recommendations

Stocking---The stream should be heavily stocked with legal sized trout at numerous intervals through the fishing season.

Improvements---The stream should be made a succession of dams and ponds (holding basins).



These recommendations would only apply to the section below the Rearing Station,  
SILVER CREEK  
 if the latter is constructed.

Winneshiek County

Examined by Salzer on July 6, 1932 at the following points:

Sta. 8: Sec. 35, T. 100 N., R. 6 W.

Sta. 8a: one mile below Sta. 8.

[Not to be confused with Silver Creek in Allamakee County].

Tributary to: Upper Iowa River.

Temperatures:

Location	Date	Air	Water
Sta. 8	July 6	75° F	73° F
Sta. 8a	July 6		71° F

Width.--Averaging only 4 feet at Sta. 8; 12 feet at Sta. 8a.

Depth.--4 to 6 inches at Sta. 8; 1 foot at Sta. 8a.

Bottom.--Hard pan and loose rubble at Sta. 8.

Natural Food.--Forage fish plentiful; crayfish abundant; insect food poor  
 (a few mayflies and some caddis and black flies; only two scuds seen).

Forage Fish.--Many blunt-nose minnows; some suckers and large chubs; a few  
 Johnny and fan-tail darters.



## SILVER CREEK

Winneshiek County

Examined by Salyer on July 6, 1932 at the following points:

Sta. 8: Sec. 35, T. 100 N., R. 9 W.

Sta. 8a: one mile below Sta. 8.

[Not to be confused with Silver Creek in Allamakee County].

Tributary to: Upper Iowa River.Temperatures:

Location	Date	Air	Water
Sta. 8	July 6	75° F	73° F
Sta. 8a	July 6		74° F

Width.--Averaging only 4 feet at Sta. 8; 12 feet at Sta. 8a.Depth.--4 to 8 inches at Sta. 8; 1 foot at Sta. 8a.Bottom.--Hard pan and loose rubble at Sta. 8.

Natural Food.--Forage fish plentiful; crayfish abundant; insect food poor (a few mayflies and some caddis and black flies; only two scuds seen).

Forage Fish.--Many blunt-nose minnows; some suckers and large chubs; a few Johnny and fan-tail darters.



# UPPER IOWA PINE CREEK

Howard, T 100 N., R 9 and 10 W., Winneshiek County

Data by Editor Bishop of Decorah; examined by Salyer, July, 1932.

Creek, a fair trout stream August 21, 1932; other information from several sources.

Well cold water. Cities are said to dump sewage, after tank treatment and sand filtration averages 8' wide for 1 mile tributaries. These are Cresco and Calmar as well as 5 and 6 ft. holes.

## Temperatures:

Location	Taken by	Date	Time	Water	Air
		(1932)			
Mouth, Bigallie Cr.	Salzer	July 6	1:30 P.M.	72° F	83° F
Decorah	Tarnwell	Aug. 21	12:30 A.M.	65° F	73° F

Water.--Clear at mouth of Bigallie Creek; discolored and quite silty at Decorah.

Width.--About 80 feet at mouth of Bigallie Creek; 100 feet at Decorah.

Bottom.--Clean rubble at mouth of Bigallie Creek; many stones at Decorah.

Cover.--Poor

Game Fish.--A few small-mouth are caught at Decorah, according to general testimony. Editor Bishop of Decorah also claims that some rainbow trout are caught in the river.

Rough Fish.--There are carp in the ponds up the Upper Iowa. We understand that at a power dam 9 miles above Decorah many carp are stranded when flood stage is on, as the power company must then open gates to prevent flooding of farm lands.



# UPPER IOWA RIVER

Howard, Winneshiek and Allamakee counties

Examined by Salyer at Decorah, July 6, 1932; by Tarzwell at mouth of Bigallis Creek, Howard County, on August 21, 1932; other information from several sources.

Pollution.--Three cities are said to dump sewage, after tank treatment and sand filtration, into the Upper Iowa or its tributaries. These are Cresco and Calmar as well as Decorah.

## Temperatures:

Location	Taken by	Date	Time	Water	Air
Mouth, Bigallis Cr.	Salyer	July 6	1:30 P.M.	72° F	83° F
Decorah	Tarzwell	Aug. 21	10:30 A.M.	65° F	70° F

Water.--Clear at mouth of Bigallis Creek; discolored and quite silty at Decorah.

Width.--About 80 feet at mouth of Bigallis Creek; 100 feet at Decorah.

Bottom.--Clean rubble at mouth of Bigallis Creek; many stones at Decorah.

Cover.--Poor

Game Fish.--A few small-mouth are caught at Decorah, according to general testimony. Editor Bishop of Decorah also claims that some rainbow trout are caught in the river.

Rough Fish.--There are carp in the ponds up the Upper Iowa. We understand that at a power dam 9 miles above Decorah many carp are stranded when flood stage is on, as the power company must then open gates to prevent flooding of farm lands.

Current.--Moderately increasing on the riffles, which are 3 to 10 yards long.

Width.--6 to 25 feet, averaging 15 feet at Sta. 6; averaging 4 feet at Sta. 9.

Depth.--2 feet at Sta. 9; 12 to 18 inches at Sta. 6.

Pools.--Good and frequent, as much as 4 or 5 feet deep; many undercut around pool on willow roots; average every 30 feet.



## CANOE CREEK

West (or Middle) Branch

Winneshek County

Examined by Salyer at Sta. 6 (Sec. 9, T 99 N, R 8 W), at Sta. 7 (SW corner of Sec. 9, below Sta. 6), at Sta. 7a (two miles below Sta. 6), at Sta. 9 near headwaters, on July 6, 1932. At Sta. 6 a mile of stream was carefully examined (half-mile to either side of bridge), and practically the whole length of stream was frequently visited from road in creek valley.

Water Supply.--Bottom springs said to come in frequently; 4 springs make a wet marsh and flow through several channels for 300 yards to creek. (Temperature of these springs  $9^{\circ}$  to  $10^{\circ}$  C =  $48^{\circ}$  to  $50^{\circ}$  F at source, and  $14^{\circ}$  C =  $57^{\circ}$  F at mouth).

Shore.--Chiefly wooded (nice hardwood growths), with green meadows alternating about mile for mile. Pastureland at Sta. 9 (open meadow for  $1\frac{1}{2}$  miles).

Use of Water.--Public fishing allowed.

Temperature.

Location	Date	Air	Water	Remarks
Sta. 9	July 6	-----	$71^{\circ}$ F	before rain
1 mi. above Sta. 6	July 6	-----	$67.5^{\circ}$ F	before rain
Sta. 6	July 6	$82^{\circ}$ F	$68.5^{\circ}$ F	before rain
Sta. 7	July 6	$80^{\circ}$ F	$67^{\circ}$ F	before rain
Sta. 7a	July 6	$67^{\circ}$ F	$68.5^{\circ}$ F	rainstorm

Water.--Turbid when examined, but clear after rains; pH 7.9; oxygen, 8.3 p.p.m. at bridge on July 6 (Mark).

Current.--Moderately increasing on the riffles, which are 3 to 10 yards long.

Width.--6 to 25 feet, averaging 15 feet at Sta. 6; averaging 4 feet at Sta. 9.

Depth.--2 feet at Sta. 9; 12 to 18 inches at Sta. 6.

Pools.--Good and frequent, as much as 4 or 5 feet deep; many undercut around pool on willow roots; average every 30 feet.



Middle CANOE CREEK

Winneshiek County

(See following data on the main branch, known as West or Middle Branch).

Temperature.--One mile below junction of Main and East Branch, on July 6, the temperature was up to 70°, but just below a good spring feeder comes in.

Game Fish.--Trout are said to inhabit the stream for some distance below the junction of the branches, and according to Professor Strunk, there are some bass in the lower stretches.

Recommendations

Stocking.--The main creek below the branches should be fed by plantings in the branches and feeders. How far downstream conditions fit for trout prevail, we cannot say, but the lower part of the creek has some bass.

Shore.--Rock-strewn above sandy banks

Surrounding Country.--A few fields, but mainly open pastures.

Use of Water.--Public fishing allowed.

Temperature.--This is a cold creek. On July 6 at 8:30 A.M. at Sta. 5, water was 56° F (air 76° F); at 10:30 A.M. near upper part of Sta. 5, water was 66° F (was sunny in morning) above springs (air 88.5° F); at 3:00 P.M. at Sta. 9, during rain, with air at 71° F, water was raised to 73° F.

Water.--Slow, but requires several days to clear after rain.

Current.--Generally slow, but speeding up on frequent, short riffles.

Length.--

Width.--4 to 15 feet, averaging 10 or 12 ft. at Sta. 5, averaging 4 to 6 ft. at Sta. 9.

Depth.--Averaging 1 ft. at Sta. 5; averaging 4 to 8 inches where ditched and at Sta. 9.

Pools.--Fair for  $\frac{1}{2}$  mile below bridge at Sta. 9; even present where stream is ditched; some very good spring pools at Sta. 5; here a good pool every 30 or 60 ft.



(this condition said to hold for CANOE CREEK frequent pools in undercut banks.

### Middle (or Main) Branch

Bottom.--Stones and gravel, and some pebbles, often overlaid with silt.

### Winneshiek County

Cover.--No cover outside of numerous 3 to 15 inch boulders, undercut banks and

Examined by Salyer at Sta. 5 and Sta. 9a on July 6, 1932. Sta. 5 was a mile

stretch, cruised--with frequent stops--for a mile above and two below; Sta. 9

examined near bridge near head.

half-mile below bridge at Sta. 9; upper half of Sta. 5 moderately shaded by open

### Tributary to.--Upper Iowa River

woods (larger trees--no willows or shrubs).

Water Supply.--Good and constant; in  $\frac{1}{2}$  mile 7 springs at 50° F counted; 4 of

these unite to form a nice feeder 2 or 3 feet wide and 12 to 18 inches deep, running

150 feet to creek (temp. 50° F); floods several times each summer, getting out of

banks in places.

Pollution.--None

Dredging.--Stream dredged for 400 yards above bridge.

Shore.--Rock-strewn above mucky banks

Surrounding Country.--A few fields, but mainly open pastures.

Use of Water.--Public fishing allowed.

Temperature.--This is a cold creek. On July 6 at 9:25 A.M. at Sta. 5, water

was 56° F (air 76° F); at 10:20 A.M. near upper part of Sta. 5, water was 68° F

above springs (air 52.5° F); at 3:00 P.M. at Sta. 9, during rain, with air at 71° F,

water was raised to 73° F.

Normally

Water.--Clear, but requires several days to clear after rain.

Current.--Generally slow, but speeding up on frequent, short riffles.

Length.--

Width.--6 to 15 feet, averaging 10 or 12 ft. at Sta. 5, averaging 4 to 6 ft.

Depth.--Averaging 1 ft. at Sta. 5; averaging 4 to 8 inches where ditched and

Pools.--Fair for  $\frac{1}{2}$  mile below bridge at Sta. 9; even present where stream is

ditched; some very good spring pools at Sta. 5; here a good pool every 50 or 60 ft.



(this condition said to hold for 3 miles); frequent pools in undercut banks.

Bottom.--Stones and gravel, and some rubble, often overlaid with silt.

Cover.--No cover outside of numerous 8 to 15 inch boulders, undercut banks and weeds.

Shade.--Upper reaches said to have in general poor shade or none; fair for half-mile below bridge at Sta. 9; upper half of Sta. 5 moderately shaded by open woods (larger trees--no willows or shrubs).

Vegetation.--Infrequent patches of water buttercup; cress in larger spring feeder.

Natural food.--Extremely poor; on stones less than one organism per 5 square inches; 2 scuds found in cress at head of spring feeder, and a few dragonfly larvae and mayflies; many larger crayfish; forage fishes abundant.

Spawning Grounds.--A very limited ground at head of small feeder.

Fishing.--The stream is fished by individuals who know about the occasional trout which occurs here; older residents say this was originally a brook trout stream; the occasional trout now caught are mostly taken early in the season.

Game Fish.--Only 2 trout (browns) seined--5 to 7 inches.

Coarse Fish.--Suckers and red-horse common

Forage Fish.--Abundant (several species of minnows and darters); some large chubs.

#### Recommendations

Stocking.--Until improved, we recommend a limited stocking with brown and some rainbow trout of legal or near-legal size.

Spawning Increase.--The spring feeder at Sta. 5 might be made into a good spawning place by clearing out and installing gravel.

Shelter Improvement.--Stones are available and should be rearranged in low dams to create small holding basins, each of which should be given some cover.



## WATERSHED REPORT

## TROUT RUN RIVER

Winneshiek County  
Winneshiek CountyExamined for entire length by Salyer on July 7, and by Hobbs on August 9, 1932.  
According to Editor Bishop of Decorah, this stream does not wash, has good

holes, and was formerly the best stream near Decorah. (Just the opposite--Salyer).

Tributary to.--Trout Run of Upper Iowa System.Water Supply.--Stream arises in immense spring, one of the largest in Iowa (estimated flow on August 9, ca. 100 cfs.). Upper half flooded very little (stream rarely rises to top of very low bridge by farm); lower half receives bad floods from dam.Pollution.--None, except for a little barnyard waste at farm.Temperature.--Very cold: the spring registered 51° F on July 7, 11:30 A.M., when air was at 60° F; and 9.4° C = 48.9° F on August 9, when air was 22.5° C = 72.5° F.Current.--Extremely swift (3.3 ft./sec.); there are long swift riffles 4 to 6 inches deep.Width.--Averages 10 to 17 feet.Depth.--12 to 15 inches with frequent holes up to 4 feet deep.Cover.--Not very good now; plenty of stones are available, however, for improvement constructions.Vegetation.--Much grass and water buttercup; some algae (*Cladophora*).Natural Food.--Present in considerable amount; scuds (*Cyclops*) abundant; annelids plentiful on stones above silt; many midge larvae in silt layer held by *Cladophora*; muddlers or miller's thumbs (*Cottus*) abundant (a good trout food); 3 to 5 of these muddlers were taken in each seine haul.Coarse Fish.--Suckers were found to be numerous.Forage Fish.--The northern species of muddler or miller's thumb (*Cottus cognatus*) abundant. (The taking of this species, which is virtually confined to cold trout streams in the north, was one of the big surprises of the Iowa field work).  
A few long-nosed dace.



SEIVERT SPRING CREEK

Winneshek County

Examined for entire length by Salyer on July 7, and by Hubbs on August 9, 1932.  
On farm of Mr. J.O. Hjelle.

Tributary to.--Trout Run of Upper Iowa System.

Water Supply.--Stream arises in immense spring, one of the largest in Iowa  
(estimated flow on August 9, cu. ft./sec). Upper half flooded very little  
(stream rarely rises to top of very low bridge by farm); lower half receives bad  
floods from dam.

Pollution.--None, except for a little barnyard waste at farm.

Temperature.--Very cold: the spring registered  $51^{\circ}$  F on July 7, 11:30 A.M., when  
air was at  $89^{\circ}$  F; and  $9.4^{\circ}$  C =  $48.9^{\circ}$  F on August 9, when air was  $22.5^{\circ}$  C =  $72.5^{\circ}$  F.

Current.--Extremely swift (3.2 ft./sec.); there are long swift riffles 4 to 6  
inches deep.

Width.--Averages 10 to 17 feet.

D Depth.--12 to 15 inches with frequent holes up to 4 feet deep.

Cover.--Not very good now; plenty of stones are available, however, for improve-  
ment constructions.

Vegetation.--Much cress and water buttercup; some algae (Cladophora).

Natural Food.--Present in considerable amount; scuds (Gammarus) abundant;  
caddis plentiful on stones above silt; many midge larvae in silt layer held by  
Cladophora; muddlers or miller's thumbs (Cottus) abundant (a good trout food);  
3 to 6 of these muddlers were taken in each seine haul.

Coarse Fish.--Suckers were found to be numerous.

Forage Fish.--The northern species of muddler or miller's thumb (Cottus  
cognatus) abounds. (The taking of this species, which is virtually confined to cold  
trout streams in the north, was one of the big surprises of the Iowa field work).

A few long-nosed dace.



## Recommendations

We are pointing out in another report the advantages of this site for a large rearing station. Should this be built, the improvement of the stream would be all in connection with that development. If, however, the rearing station is not built, a series of stone dams transforming the creek into a chain of holding basins would make it capable of holding several hundred adult trout, preferably to be replaced by stocking through the season.

long dry run which carries much flood water after rains.

Erosion.--The banks toward the mouth are being held by willows, so that erosion is prevented. Somewhat farther up, below the mouth of Sleepy Hollow Branch, flood action is severe, and the stream flows in a wide bed between 15-foot banks.

Run.--None.

Temperature.

Location	Date	Time	Air	Water
Headwater spring	August 15	11:45 A.M.	81° F	50° F
Just above mouth of Sleepy Hollow Br.	August 15			62° F
Just below mouth of Sleepy Hollow Br.	August 15			65° F
Road near mouth	August 15	10:15 A.M.	79° F	69° F

Water.--Clear

Current.--Pools and riffles.

Pools.--Numerous

Cover.--little in pools.

Shade.--Near bridge near mouth, willows along the banks.

Trout Conditions.--The lower portion of this creek, from just below junction of branches to mouth, is not suitable for trout in the summer under present conditions. The headwater spring produces enough flow to make stream immediately suitable for trout. As a whole this is good trout stream.



## CLEAR CREEK

## Allamakee County

Examined by Tarzwell on August 15, 1932, throughout entire length.

Tributary to.--Upper Iowa River, (entering in Sec. 35, Union City Township).

Water Supply.--Springs enter at frequent intervals, adding to the flow and keeping the creek cool. The headwater spring is large. Above the spring is a long dry run which carries much flood water after rains.

Erosion.--The banks toward the mouth are being held by willows, so that erosion is prevented. Somewhat farther up, below the mouth of Sleepy Hollow Branch, flood action is severe, and the stream flows in a wide bed between 15-foot banks.

Dam.--None.

Temperature.

Location	Date	Time	Air	Water
Headwater spring	August 15	11:45 A.M.	81° F	50° F
Just above mouth of Sleepy Hollow Br.	August 15			62° F
Just below mouth of Sleepy Hollow Br.	August 15			65° F ↓
Road near mouth	August 15	10:15 A.M.	79° F	69° F

Water.--Clear

Current.--Pools and riffles.

Pools.--Numerous

Cover.--Little in pools.

Shade.--Near bridge near mouth, willows along the banks.

Trout Conditions.--The lower portion of this creek, from just below junction of branches to mouth, is not suitable for trout in the summer under present conditions. The headwater spring produces enough flow to make stream immediately suitable for trout. As a whole this is good trout stream.



## Recommendations

### Stocking.--

Allamakee County

Improvement.--The numerous pools very much need cover, to give the fish a place to hide. This is especially in such a creek, so clear that trout are readily seen. Stakes can be driven in some of the pools, making it possible to build "bank covers" and "square covers." Care must be exercised, to insure that the stakes are firmly seated. In the pools having a rock bottom, shelters such as built in Glover's Creek should be installed. Where the pools are not deep enough, stone dams should be built to deepen the water. These must be carefully constructed, and should have spillways so as not to obstruct trout migration. The dams should be placed where they will not cause an excessive widening of the stream.

In the many places where the stream spreads too widely on the riffles between pools, breaking up into several winding channels, the rock fragments should be moved so as to make the stream follow a single, narrow channel. This would help to hold down the temperature of the water. A deflector at the foot of the pool above the riffle will aid greatly in confining the current.

Water.--Dark from silt; very easily roiled; pH 7.3.

Current.--Rather slow in lower 2 miles, fast in next 2 miles (3 ft./sec. by float).

Width.--4-30 feet, averaging 12 or 15 feet.

Depth.--Shallow in lower 4 miles (average 6 inches).

Pools.--Almost none in lower 2 miles; a few poor, shallow pools in next 2 miles, one per 50 yards.

Bottom.--A heavy silt-and deposit over original gravel and boulder bottom.

Cover.--Virtually none; material available for shelter construction consists of many stones in upper reaches and some fallen logs in pasturelands.



Shade.--Very little in lower SILVER CREEK in next 3 miles, but generally scattered and poor.

Allamakee County

Examined by Salyer over lower 6 or 7 miles (French Township) on July 6, 1932.

Tributary to.--Upper Iowa River to sides and tops of larger stones in stream

Water Supply.--Surface and spring water; an average of one small-flow spring per mile; terrifically flooded in spring, especially toward mouth; Murphy's Spring proved small and barnyard polluted. 15" wide and 4" deep.

Pollution.--Some barnyard pollution. Little was killed.

Shore.--Rich black muck. said (by speaker and others) to be caught in upper

Surrounding Country.--Open pastures alternating with cornfields and an occasional hay meadow; stream runs in a straight valley between high knolls with wooded crests.

Use of Water.--Public fishing generally permitted except on farm of Mr. Murphy, who is said to get state trout (brook) for his own place, even his little spring.

Temperature.--71° F at 4:30 P.M. on July 6 (air at 80°), then sunny, but had been raining several days before. One spring 3½ miles from mouth was 68°; Murphy's Spring, 4½ or 5 miles up, was 59°.

Water.--Dark from silt; very easily roiled; pH 7.3.

Current.--Rather slow in lower 2 miles, fast in next 2 miles (3 ft./sec. by float).

Width.--6-30 feet, averaging 12 or 15 feet.

Depth.--Shallow in lower 4 miles (average 6 inches).

Pools.--Almost none in lower 2 miles; a few poor, shallow pools in next 2 miles, one per 50 yards.

Bottom.--A heavy silt-mud deposit over original gravel and boulder bottom.

Cover.--Virtually none; material available for shelter construction consists of many stones in upper reaches and some fallen logs in pasturelands.



Shade.--Very little in lower 2 miles; more in next 2 miles, but generally scattered and poor.

Vegetation.--Confined to grasses growing out on mud flats.

Natural Food.--Little; confined to sides and tops of larger stones in stream beds.

Spawning Grounds.--None which seem good; Mr. Murphy claims brook trout have spawned in overflow from his spring, where 15" wide and 4" deep.

Predators.--One 25-pound snapping turtle was killed.

Fishing.--A few trout are said (by Speaker and others) to be caught in upper stretches, despite bad conditions; quite a few years ago rainbow trout were said to have been caught.

#### Recommendations

Stocking.--To recommend that Minnesota stock the stocking of this

#### Recommendations

Stocking.--This stream does not appear to us to be worth stocking with trout or any other kind of fish.

Improvement.--Very desirable.



## WATERLOO CREEK

Allamakee County

(heads in Minnesota)

Information from Mr. Moe (July 9, 1932).

Tributary to.--Bear Creek near mouth into Upper Iowa River.

Water Supply.--"Springs all along."

Surrounding Country.--Heavily wooded (in part open woods).

Length.--7 miles.

Pools.--A few big holes as long as 16 rods and as deep as 6 feet.

Shade.--Good

### Recommendations

Stocking.--We recommend that Iowa share with Minnesota the stocking of this stream, preferably with yearling trout. Mr. Moe says that Minnesota residents buy Iowa licences so as to fish the lower part of the stream.

Improvement.--Very desirable.

Notes.--Clears quickly after rains; oxygen 7.5 p.p.m., July 6.

Length.--About 15 miles.

Width.--12 to 15 feet at Quendahl, averaging 40 feet at Sta. 10

Depth.--Uniform for long stretches, running 1 to 3 feet at Sta. 10.

Pools.--Deeper holes frequent at Sta. 10 (some to 10 ft. reported); good holes under boulders and trees at Quendahl.

Cover.--Snags frequent.

Shade.--Excellent--many willows and box-elders. Several of the feeders show water-grown box-elders.

Natural Food.--Good above Quendahl.

Predators.--Several kingfishers seen; 2 suckers seemed showed bird marks.

Fishing.--Residents agree this is best trout stream in Iowa. The best trout fishing is said to run 4 miles to either side of county line on both branches.



Source Fish---Winnebago (several) BEAR CREEK (several) (Sta. 10).

### Winneshiek and Allamakee Counties

Examined by Salyer on July 6, 1932 at Sta. 10 (Sec. 29 and 30, Waterloo Township) and at Quandahl (rain prevented examination farther up).

Tributary to---Upper Iowa River. is one of the best prospects in the state

Water Supply---Largely spring-fed; there are said to be many underwater springs. Said not to have flooded for 10 or 12 years until this spring, when stream flooded bottom lands about 2 feet.

Pollution---Siltling: not bad as yet.

Surrounding Country---Hills, with much native pine; probably no more clearing will be done.

### Temperature.

Location	Date	Time	Air	Water	Remarks
Sta. 10	July 6	4:00 P.M.	73° F	68° F	cloudy
Sta. 10	July 6	6:30 P.M.		65° F	rain

Water---Clears quickly after rains; oxygen 7.5 p.p.m., July 6.

Length---About 13 miles.

Width---12 to 15 feet at Quandahl, averaging 40 feet at Sta. 10

Depth---Uniform for long stretches, running 1 to 3 feet at Sta. 10.

Pools---Deeper holes frequent at Sta. 10 (some to 10 ft. reported); good holes under boulders and trees at Quandahl.

Cover---Snags frequent.

Shade---Excellent---many willows and box-elders. Several of the feeders show water-sown box-elders.

Natural Food---Good above Quandahl.

Predators---Several kingfishers seen; 2 suckers seined showed bird marks.

Fishing---Residents agree this is best trout stream in Iowa. The best trout fishing is said to run 4 miles to either side of county line on both branches.



Forage Fish.--Shiners (several species) and suckers numerous (Sta. 10).

### Recommendations

Stocking.--Planting should be done above Quandahl. There is much local, and in Winnebago County, interest in having the stream planted. also at Sta. 20, at junction of headwaters;

Shelter Improvement.--This stream is one of the best prospects in the state for modern improvement work.

Water Supply.--A number of spring feeders in mid-course. Very subject to floods; above Sta. 19 the stream is reported to have run dry in summer.

Pollution.--The only considerable source of urban pollution entering the Yellow seems to be the sewage of Postville, and this is listed as receiving tank treatment and sand filtration.

Surrounding Country.--Pastures (Sta. 19).

Temperature.--Warm at junction of branches (81° F at 3:30 P.M. on July 8, with air at 87° F); cooled farther down by spring inflow.

Water.--Very silty and muddy when seen (from rain 2 days previous).

Current.--Long stony riffles.

Width.--21 feet at Sta. 19; 9 feet at Sta. 20.

Depth.--2" to 3' or 4' (Sta. 19); 4" to 3" (Sta. 20).

Pools.--None good holes (Sta. 19); none at Sta. 20.

Bottom.--Stony in both riffles and pools; some rock outcrops.

Cover.--None.

Shade.--Poor (Sta. 19).

Natural Food.--At Sta. 19, best seen (to date of examination); at Sta. 20, crayfish numerous.

Fishing.--Some trout are caught at the mouth of\* and for 5 or 6 miles below the spring-fed Stone House Creek. There are some in the North Branch and as far down as Volney. Bass are also caught here. It is essentially a bass river.

Coarse Fish.--Suckers.

Forage Fish.--Minnows, chubs, dace, shiners and darters numerous.

\* Report by Mr. Gmelin, of Elkader.



## YELLOW RIVER

## Winneshiek and Allamakee Counties

Examined by Salyer at Sta. 19 (at Highway 51, NE of Postville at 2 P.M.), and at several points 2 to 4 miles below; also at Sta. 20, at junction of headwaters; all on July 8, 1932. Other information obtained from sportsmen, etc., by Salyer and Hubbs.

Water Supply.--A number of spring feeders in mid-course. Very subject to floods; above Sta. 19 the stream is reported to have run dry in summer.

Pollution.--The only considerable source of urban pollution entering the Yellow seems to be the sewage of Postville, and this is listed as receiving tank treatment and sand filtration.

Surrounding Country.--Pastures (Sta. 19).

Temperature.--Warm at junction of branches (81° F at 3:30 P.M. on July 8, with air at 87° F); cooled further down by spring inflow.

Water.--Very silty and muddy when seen (from rain 2 days previous).

Current.--Long stony riffles.

Width.--21 feet at Sta. 19; 9 feet at Sta. 20.

Depth.--9" to 3' or 4' (Sta. 19); 4" to 8" (Sta. 20).

Pools.--Some good holes (Sta. 19); none at Sta. 20.

Bottom.--Stony in both riffles and pools; some rock outcrops.

Cover.--None.

Shade.--Poor (Sta. 19).

Natural Food.--At Sta. 19, best seen (to date of examination); at Sta. 20, crayfish numerous.

Fishing.--Some trout are caught at the mouth of\* and for 5 or 6 miles below the spring-fed Stone House Creek. There are some in the North Branch and as far down as Volney. Bass are also caught here. It is essentially a bass river.

Coarse Fish.--Suckers.

Forage Fish.--Minnows, chubs, dace, shiners and darters numerous.

\* Report by Mr. Gmelin, of Elkader.



French Cr.  
Upper Iowa R.

Bottom.--Rock and gravel overlaid by silt at Sta. 9; good gravel in most of Sta. 6, sometimes overlaid with silt for rod or so.

Cover.--Good in wooded sections, in form of projecting roots and overhanging branches of willows; some logs for shelter construction (few now in stream).

Shade.--Provided in part by heavy growth of emergent plants; 1 1/2 miles below bridge of Sta. 5 also shaded by heavy woods, with many heart-leaved willows and stream-sown box-elders.

Vegetation.--Stream weedy; much Sagittaria and other emergent plants; a little water buttercup.

Natural Food.--Abundant at Sta. 9; at a minimum in main part of stream; on surface food here more abundant than bottom food; few mayflies; more black flies; one caddis per 5 or 6 stones on average; less than 1 organism to 5 square inches of stone; ~~ever~~ crayfish and forage fishes abundant.

Spawning Grounds.--Gravel is present, but the silting would likely kill eggs.

Predators.--In one mile we saw only one kingfisher and one garter snake.

Fishing.--Local anglers always refer to this as a trout stream; some brown trout are said to have been caught recently; individuals familiar with stream are said to catch trout frequently.

Rough Fish.--Several suckers seined.

Forage Fishes.--Minnows and shiners very abundant, especially blunt-nose minnows; chubs abundant and large; a few darters. Near headwaters (Sta. 9); same species occur, along with brook sticklebacks.

Recommendations

Stocking.--Should be stocked with legal or nearly legal size trout at beginning of trout season and several times during season. The expectation is that the fish will be caught off before the next winter. Fry or young fingerlings would have a poor chance.



TRIBUTARY TO FRENCH CREEK

Allamakee County

Examined by Salyer on July 6, 1932.

Tributary to.--French Creek, entering from east about 2 rods above Fetkelter Bridge.

Water Supply.--A series of springs bubble in at water line about  $\frac{1}{2}$  mile above mouth, forming a large lagoon about 75 yards long and up to 6 feet deep.

Temperature.--This is a cold feeder, 58° F on July 6, 2 to 3 P.M. The springs are 49° F.

Size.--About 3 miles long; at mouth flowing 2 feet wide and 6 inches deep on the average.

Fishing.--Residents report that quite a few trout are taken here early in the spring. We neither seined nor saw any, but they may have retired farther upstream in July.

Recommendations

This feeder should be improved for spawning purposes and closed to fishing.

Pollution.--Apparently none, except from wash.

Dam.--An old dam about  $\frac{1}{2}$  mile below Fetkelter Spring makes a deep pool.

There is another old log dam about 300 yards above the spring. Neither have much effect on level of water or in fish movement.

Immediate Shore.--High banks in places; elsewhere low and meadowy.

Surrounding Country.--The stream courses between high, parallel wooded knolls in a valley, which is mostly pastured, with an occasional corn field. The valley as a whole is meadow-like, and unshaded.

Public Access.--Yes.

Temperatures.--The stream is generally kept cool, by the spring, though it warms up as much as 6° F between the springs. It receives enough spring water, so that it does not freeze in winter for about 3 miles near Fetkelter Bridge. From 2 to 2½



## FRENCH CREEK

Allamakee County

Examined by Salyer, July 6, 1932

This fast, cool-water stream was examined at the bridge by Fetkelter Spring, and for nearly a mile above and a half-mile below by cruising, and for  $1\frac{1}{2}$  miles below by frequent visits from nearby road. It was also briefly examined at a point 2 to  $2\frac{1}{2}$  miles below the bridge.

Tributary to.--Upper Iowa River.

Tributaries.--A feeder capable of improvement for the spawning of a limited number of trout comes in about 2 rods above Fetkelter bridge, on east side of stream.

Water Supply.--For about 3 miles above this bridge, by stream course, there are good flowing springs, at intervals of  $\frac{1}{2}$  mile to 1 mile. A couple of springs also come in along the stretch below the bridge. The stream seems to flood as much as 6 feet above summer level; this would bring it over its banks to the extent of 20 or 30 feet.

Pollution.--Apparently none, except from wash.

Dam.--An old dam about  $1\frac{1}{2}$  miles below Fetkelter Spring makes a deep pool. There is another old log dam about 300 yards above the spring. Neither have much effect on level of water or in fish movement.

Immediate Shore.--High banks in places; elsewhere and meadows.

Surrounding Country.--The stream courses between high, parallel wooded knolls in a valley, which is mostly pastured, with an occasional corn field. The valley as a whole is meadow-like, and unshaded.

Public Access.--Yes.

Temperatures.--The stream in general kept cool, by the spring, though it warms up as much as 60° F between the springs. It receives enough spring water, so that it does not freeze in winter for about 3 miles near Fetkelter Bridge. From 2 to  $2\frac{1}{2}$



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miles below the bridge the stream warms up well toward the upper limit for trout, (73° F with air at only 80° F at 4:15 P.M.).

Water.--Somewhat roiled from rain; gets dirtier downward.

Current.--Moderate to fast; many good riffles; where 9 inches deep. Slower 2 to 2½ miles below bridge.

Length.--About 6 miles.

Width.--5 to 35 feet (averaging 12 feet) below Fetkelter Bridge; 4 to 12 feet (averaging 8 feet) above Spring; 6 to 20 feet (averaging 15 feet) 2 to 2½ miles below bridge.

Depth.--Averaging 10 inches.

Pools.--Pools are generally good over most of the stream's course. The old dam 1½ miles below Fetkelter Springs Bridge makes a deep pool. In the first half-mile above this bridge there are beautiful holes, below large boulders and along side of bank. Often there are several pools 1 to 3 feet deep in each 25 yards of stream course. In connection with the previous survey of this and other trout waters by the hatchery men we observe that the field men underestimated the pools. They apparently referred only to pools 2 to 3 feet, whereas in these streams legal-sized trout can find sufficient shelter in pools much less deep. There are 8 or 12 pools more than 4 feet deep in the first mile above the bridge. Where the largest spring enters, a long, deep pool results. Two to 2½ miles below the bridge the pools are fewer and muddier, but deep.

Bottom.--Above and below Fetkelter Springs there are gravel and rubble riffles, about one-fourth mile long and alternating with sand sections of similar extent; but these are often largely ruined by being covered with silt 4 to 6 inches deep. Two to 2½ miles below the springs there is a half-mile stretch of silty sand.

Cover.--The stream is seriously deficient in cover. The holes for a quarter or half-mile above the bridge have some cover in the form of protruding roots of trees long since cut. The water weeds provide some shelter.



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Shade.--Very little above bridge (a lone willow here and there); better below bridge.

Vegetation.--There is a good growth of water buttercup and a small plant of the Decodon type above the bridge, and the buttercup was also found below the bridge.

Natural Food.--Food is not overly abundant. The aquatic organisms live chiefly on the stones which rise several inches above the silted bottom and occur mostly on the sides rather than the bottom of the stones. There are a few mayflies and stoneflies and a good many black-fly larvae. Net-building caddis and mayflies are rather abundant on the riffles. A few crayfish and a fair supply of minnows was found.

Spawning Grounds.--Not very good. The feeder referred to above seems capable of providing spawning facilities for a limited number of trout. There is suitable gravel for spawning in parts of the main creek.

Predators.--Only one kingfisher seen.

Fishing History and Conditions.--This is one of the Iowa trout streams whose previous history has been good, but which has been declining, because of silting, lack of cover and shade, and fairly heavy fishing (the stream is known to residents of surrounding counties). It has ~~been~~ the general reputation of having been one of the best trout streams in Allamakee County. Trout are still caught in the stream each spring, especially in the stretch below the bridge. It is rather extensively fished at that season.

The lower 2 or 3 miles or so of the stream hardly look like trout water, especially over the ~~silty~~<sup>sand</sup> stretch referred to above. However, large trout are sometimes taken there, according to reports (a reliable angler at Oelwein spoke of getting a 19½ inch rainbow trout 2½ miles above the mouth in the spring of 1932).



### Recommendations

Improvement.--The improvement of the mile-and-a-half stretch of French Creek below Fetkelter Springs would appear possible and very profitable. A great improvement in shade and cover could be made here. With some additional improvements elsewhere, one could expect 4 miles of trout fishing water, 2 or 3 miles of additional nursery water, and perhaps a spawning zone in the headwaters. We would suggest first the extensive planting of willows for shade; the narrowing of the stream by using deflectors in broad places; cleaning out and shading of spring runs; and building holding basins behind small stone dams (for a mile or so, plenty of boulders and stones are at hand), with the addition of stone and log covers. Some of the present pools are good, except that they need cover badly.

Pools.--Some in lower part.

Bottom.--Excellent in places.

Shade.--None.

Vegetation.--Present.

Trout Conditions.--This stream is an excellent place for young brook trout. It would support a large number of fingerlings as the flow is large.

### Recommendations

Stocking.--Brook trout fingerlings.

Shade.--Should be planted in places along the south side.

Cover.--The pools need cover. This could be made of short poles staked and wired to the bank.



Sleepy Hollow Br.  
Clear Cr.  
Upper Iowa R.

WEBER'S SPRING RUN

Allamakee County

Examined by Tarzwell on August 15, 1932.

Tributary to.--Sleepy Hollow Branch of Clear Creek and Upper Iowa River (entering in Sec. 22,  $1\frac{1}{2}$  miles above mouth of Sleepy Hollow Branch).

Water Supply.--This is the run-off of a very fine spring, and has a large flow.

Temperature.-- $49^{\circ}$  F at spring and  $55^{\circ}$  F at mouth, a rise of only  $6^{\circ}$  F (12:30 P.M., Aug. 15; air  $85^{\circ}$  F).

Water.--Clear.

Length.--One-fourth mile.

Pools.--Some in lower part.

Bottom.--Excellent in places.

Shade.--None.

Vegetation.--Present.

Trout Conditions.--This stream is an excellent place for young brook trout. It would support a large number of fingerlings as the flow is large.

Recommendations

Stocking.--Brook trout fingerlings.

Shade.--Should be planted in places along the south side.

Cover.--The pools need cover. This could be made of short poles staked and wired to the bank.



Clear Cr.  
Sleepy Hollow Cr.  
Clear Cr.  
Upper Iowa R.

## BENNECK'S SPRING RUN

Allamakee County

This is the left hand fork of the Sleepy Hollow Branch.

Examined by Tarzwell on August 15, 1932.

Tributary to.--Sleepy Hollow Branch of Clear Creek, (entering in Sec. 16, Union City Township) and Upper Iowa River.

Water Supply.--Formed by large spring; does not flood.

Surrounding Country.--Open meadow.

Temperature.--49° F (Aug. 15)

Length.--About 1/8 mile.

Predators.--The geese probably are hard on the trout.

### Recommendations

Stocking.--This spring run could be planted with brook trout fingerlings if or where the geese are excluded.

Improvements.--Willows should be planted along open meadow.

Location	Date	Time	Temp. F	Temp. C
Lower bridge in Sec. 15	Aug. 15	2:00 P.M.	55° F	71° F
1 1/2 mi. above mouth, above entrance of Weber's Spring, Sec. 22	Aug. 15	12:30 P.M.	55° F	75° F
1 1/2 mi. above mouth, low next spring run downstream below entrance of Weber's Spring, Sec. 22	Aug. 15	12:30 P.M.	55° F	61° F
At mouth, Sec. 24	Aug. 15	11:45 P.M.	52° F	59° F

Current.--Pools and broadly spread riffles.

Pools.--Some very fine large pools below Weber's Spring in Sec. 22. One of these, more than 150 ft. long and 4 to 5 ft. deep, lies just below the spring, and will always stay cold in the lower layers. There are also some fine large pools below Benneck's Spring Run.



Cover.--Pools without cover. **SLEEPY HOLLOW BRANCH**

Shade.--Generally deficient, note Allamakee County

(This is the east fork of Clear Creek, Union City Township).

Examined by Tarzwell on August 15, 1932, throughout length.

Tributary to.--Clear Creek and Upper Iowa River.

Water Supply.--Nearly all spring water in normal flow. The springs enter through feeders (which see) and also along creek. About 100 yards below Weber's Spring Run is an even larger spring, 49° F, where it enters the creek, with a flow estimated at 300 gallons per minute. The effect of these springs is shown in the temperature table. The headwaters of the main or right branch above Benneck's Spring Run carry a good deal of flood water.

Temperature.

Location	Date	Time	Air	Water
Above Benneck's Spring, Sec. 16	Aug. 15	2:20 P.M.	85° F	56° F
Upper bridge in Sec. 15	Aug. 15	2:10 P.M.	-----	67° F
Lower bridge in Sec. 15	Aug. 15	2:00 P.M.	85° F	71° F
1 1/4 mi. above mouth, above entrance of Weber's Spring, Sec. 22	Aug. 15	12:30 P.M.	85° F	75° F
1 1/4 mi. above mouth, below next spring run downstream below entrance of Weber's Spring, Sec. 22	Aug. 15	12:30 P.M.	85° F	61° F
At mouth, Sec. 24	Aug. 15	11:45 P.M.	81° F	69° F

Current.--Pools and broadly spread riffles.

Pools.--Some very fine large pools below Weber's Spring in Sec. 22. One of these, more than 150 ft. long and 4 to 5 ft. deep, lies just below the spring, and will always stay cold in the lower layers. There are also some fine large pools below Benneck's Spring Run.



Cover.--Pools without cover.

Shade.--Generally deficient, notably along pools.

Natural Food.--Mayfly and stonefly larvae are very abundant and caddisfly and blackfly larvae fairly abundant on the riffles. In general the food conditions are better than in many of the streams examined.

Trout Conditions.--Weber's Spring and the spring by the log house just below make the part of this creek just below them suitable for trout. Benneck's Spring Run and the main fork there are both favorable for trout, as is the creek down to the upper bridge in Sec. 15. From that bridge to Weber's Spring Run, conditions are hardly favorable for trout.

#### Recommendations

Stocking.--Brook trout fingerlings to be planted in the spring runs, and on the small lake just below. Creamery employees add to the unsightliness by committing nuisances on the banks of the stream.

Improvement.--The pools are in need of cover. Flooding is not very severe, but it would be best to place the covers along the bank and to stake them securely, by a cable at Maynard. and perhaps to fasten them to a tree or stake on the bank. Shade is needed very much. This should be added where the stream runs in the open, with the expectation (raining). This is a poor index of temperature conditions here.

Fishing.--This is a good stream for small-mouth bass and rock bass. that it would then contribute better water to the main creek (Clear Creek). Thus

at least 5 miles of good water for adult trout would result. The shade would not

Pollution Control.--As a minimum measure, the creamery should be required to need to be planted all along the branch, but the pools should be shaded.

dump its waste below the dam. When the stream tends to spread excessively on the riffles, a deflector should be installed above to divert the main current down a single cleared channel. The confined stream would thus not be subjected to unnecessary warming.

This is one of the best prospects for a good trout stream which we examined, and it should be among the first to receive attention.



Volga R.  
Turkey R.

NORTH BRANCH OF VOLGA RIVER  
SOUTH BRANCH OF VOLGA RIVER

Fayette County

Examined by Salyer at Sta. 23, on July 8, 1932, near headwaters, in Sec. 34,

Examined by Salyer at Sta. 23a, at Maynard, on July 9, 1932. Other information

obtained from sportsmen.

Tributary to---Volga and Turkey rivers (confluence with South Branch between

Randallia and Maynard).

Temperature---On July 8 at 7:30 P.M., 77.33° F (air 81° F).

Pollution---Creamery and septic-tank pollution enters at Maynard, but does not

appear to be very serious. The creamery washings amount to about 100 gallons per

day. The water shows the pollution in the way of pollution fungi, blue-green

rafts and an oily coating on the surface. Mark made a D.O. test of 7.1. Local

sportsmen claim that the pollution spoils the swimming, fishing and ice cutting

on the small lake just below. Creamery employees add to the unsightliness by

committing nuisances on the banks of the stream.

Dam---A small dam (3 ft. high) at Maynard.

Temperature---At 9:00 A.M. of July 9, at Maynard: water 67° F; air 69° F

(raining). This is a poor index of temperature conditions here.

Fishing---This is a good stream for small-mouth bass and rock bass.

Recommendations

Refuge---There is some call for closing some branches of the Upper Volga as

Pollution Control---As a minimum measure, the creamery should be required to

dump its waste below the dam.

Stocking---This beautiful stream should be very heavily stocked with small-

Improvement---More cover in the holes should be installed to protect the bass



Volga R.  
Turkey R.

## NORTH BRANCH OF VOLGA RIVER

Fayette County

Examined by Salyer at Sta. 22, on July 8, 1932, near headwaters, in Sec. 34, T. 93 N., R. 9 W. (there are many fishermen in the region)

Tributary to.--Volga and Turkey rivers (confluence with South Branch between Randalia and Maynard).

Temperature.--On July 8 at 7:30 P.M., 77.5° F (air 81° F).

Width.--18' to 20', spreading in places to 35'.

Depth.--8", to 4' in holes; one big hole  $\frac{1}{2}$  mile above bridge.

Bottom.--"Rock and gravel."

Shade.--Not so well shaded as parts of main river.

Natural Food.--Crayfish and minnows, chubs and darters plentiful.

Fishing.--Heavily fished; several legal small-mouth bass seen being caught here.

Game Fish.--Small-mouth bass are plentiful, feeding on crayfish; specimens of both small- and large-mouth bass were seined by us along with rock bass.

Coarse Fish.--Hog suckers seined.

### Recommendations

Refuge.--There is some call for closing some branches of the Upper Volga as spawning sanctuaries. Some of this seems to come from local residents who would fish anyway and profit from the closure. We favor instead heavy stocking with fingerlings, and building of cover for them.

Stocking.--This beautiful stream should be very heavily stocked with small-mouth bass fingerlings.

Improvement.--More cover in the holes should be installed to protect the bass fingerlings. Spreading of the stream should be largely avoided, so as not to destroy trout conditions in main river below.



VOIGA RIVER

Fayette and Clayton counties

Examined by Salyer at Sta. 24, at Fayette, on July 9, 1932. Other information obtained from well-informed local persons (there are many fishermen in the region of Olwein and of Elkader.

Tributary to.---Turkey River.

Water Supply.---Springs are said to occur all the way down.

Pollution.---Four villages are reported to contribute sanitary sewage to the Volga system: Hawkeye and Fayette (tank treatment only), Arlington (tank treatment and coarse filtration), and Strawberry Point (tank treatment and sand filtration).

Temperature.---At Sta. 24, 10 A.M., July 9, water 69.5° F, and air 75° F.

Width.---Averaging 20' to 60' at and just below Fayette.

Depth.---8" to 10" riffles about Fayette.

Pools.---Frequent holes 6' or 7' deep below Fayette.

Bottom.---Generally stony; many boulders at Fayette and below; at this town there are some sand stretches, though the bottom material is mostly flat rubble (4" to 12") and gravel.

Cover.---In general scanty, though fair at some places, as Fayette, in the form of bank undercuts about willow roots. Material for construction is largely limited to stones, as down timber is scarce. However, the limestone bluffs offer excellent material.

Shade.---On the whole intermittent, with some good stretches; good willow shade backed up by forest trees near Fayette.

Vegetation.---No plants in stream bed in stretch below Fayette.

Natural Food.---Good about Fayette--the best seen by us to date of examination: caddis abundant and mayflies and blackflies common on and about stones; midges production in Cladophora (alga) coat on stones.



Fishing.--This river enjoys one of the finest reputations of any Iowa stream, especially in the Elkader region; there are 9 or 10 miles of good fishing above Fayette (the lower part of two branches included), as well as for 5 or 6 miles below. Both small-mouth bass and trout are caught about Fayette.

#### Recommendations

This is one of the finest streams we encountered in Iowa, is worth very considerable attention.

Pollution Control.--We recommend that Hawkeye and Fayette be required to install sand filters or some other more complete sewage treatment.

Cover Increase.--The simplest means of cover increase in this stream will be the blasting down of limestone blocks from the many overhanging bluffs. We recommend that this be done on a large scale. The stream should be improved for trout and bass in upper courses for 6 miles below Fayette. It could be made into the show stream of the state.

Stocking.--The degree of success which has attended the stocking of this

stream would seem to warrant heavier stocking, using yearling trout.



ROBERTS (OR PONY) CREEK

Clayton County

Information given by local anglers to Salyer on July 8, and by Mr. Gmelin of Elkader to Hubbs on August 8, 1932.

Tributary to.--Turkey River (entering just below Elkader).

Water Supply.--Spring and surface water; greatly subject to floods; this spring (1932) extensive flood damage to Milwaukee R.R. was reported.

Dam.--None in creek or in Yellow River below mouth of creek.

Width.--15 to 20 feet.

Fishing.--"From St. Olaf down better than Turkey."

Game Fish.--"Lots of game fish." "Minnowa seiners take some rainbows."

Trout have been planted, and there are some in the stream (Gmelin).

Recommendations

Enforcement.--There seems to be a call for better protection of this stream from seiners.

Stocking.--The degree of success which has attended the stocking of this stream would seem to warrant heavier stocking, using yearling trout.



## BIG SPRING

## Clayton County

Not personally examined. Information from local residents, including Mr. Gmelin of Elkader, on August 8, 1932. Location is Sec. 32, T. 94 N., R. 5 W.

This spring issues from a cliff, runs over a fall into a pool and then "about a block" to the Turkey River. A few trout have been caught here about a stump; also a few in river below a spring, on the south side, just above Big Spring.

Since the Turkey River here is essentially a bass stream, the Big Spring should be kept open to fishing. A few trout might be planted here, especially if the spring brook can be partially dammed to form one or more trout pools.



## DRY MILL CREEK

## Clayton County

Information by Mr. Gmelin of Elkader, obtained by Hubbs, August 8, 1932.

This stream has been stocked with trout and quite a few have been caught near Clayton Center by Mr. Gmelin.

Length.--Approximately 12 mi.

Pools.--Good; frequent.

Bottom.--"lots of gravel in lower 4 miles. Some sand."

Game Fish.--"Quite a few small-mouth. Browns and rainbows have gone up spring runs in hot weather."

Recommendations

Stockings.--Yearling browns and rainbows in spring runs. Small-mouth bass fingerlings in lower courses.



## BUTTER SPRING OTTER CREEK

Fayette County

Information given Salyer by local anglers, July 8, 1932.

Tributary to.--Turkey River (entering at Elgin).

Length.--"10 miles of fishing water."

Width.--Averaging 12 ft.

Pools.--Good; frequent.

Bottom.--"lots of gravel in lower 4 miles. Some mud."

Game Fish.--"Quite a few small-mouth. Browns and rainbows here go up spring runs in hot weather."

Recommendations

Stockings.--Yearling browns and rainbows in spring runs. Small-mouth bass fingerlings in lower course."



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## DUTTON SPRING AND CREEK

### Fayette County

This spring and creek, located about 3 miles northwest of West Union, was examined on August 9, 1932, by Hubbs, in company with Mr. Jenkins of West Union. The spring is in SE  $\frac{1}{4}$  of Sec. 34, T. 95 N., R. 8 W.

The stream arises as a rather large spring on a hillside, just below Dutton Caves. It furnishes some trout fishing now, according to Mr. Jenkins and others, of West Union, but could have its carrying capacity much increased by stone dams.

We would recommend this improvement, whether or not any fish-cultural or park developments should be undertaken near the spring. The creek is about  $1\frac{1}{2}$  miles long, and lies well below the terrace where any pond might be built. The temperature is plenty low enough to warrant any number of small dams and holding basins. On August 9, the temperature at the spring head was  $9.0^{\circ}\text{C} = 48.2^{\circ}\text{F}$ .

cooked liquor after settling into a small creek that runs into Crane Creek less than 100 yards away. The bottom of the small creek has a white and greenish colored growth. Small fish were seen in both the small creek and Crane Creek. The small creek is about 6 ft. wide and the Crane about 40 ft. The plant discharge, after grease is skimmed off, amounts to about 4 to 5 barrels a day. I think the pollution is not serious at this time. I recommend that be skim daily instead of biweekly."

(signed) Wm. E. Clark Jr

Day.--One, at Alpha.

Temperature.--This is probably a fairly warm stream. Our only temperature ( $69^{\circ}\text{F}$ ) was taken early, 8 A.M., July 8 (air  $74^{\circ}$ ).

Water.--Silty after rains; cleared over night (July 7-8).

Width.--Shore running 12 to 15 ft., at Sta. 15; 20 to 30 ft. at Sta. 16.

Depth.--3 to 10 inches at Sta. 15.

Pools.--Up to 4 ft. deep in running section; a deep pool 40 ft. wide and almost a mile long by bridge of Highway 59.



Bottom.--At Sta. 15, sandy in the big pool, also gravel in current; at Sta.

CRANE CREEK

15, sandy.

Howard, Chickasaw and Fayette counties

Examined by Salyer at Sta. 15, July 7, 1932, at 7:45 P.M., at crossing of Highway 59, Howard County; and at Sta. 16 on July 8, at 8 A.M., at Lawler, east of New Hampton, Chickasaw County. Other information from sportsmen.

Tributary to.--Turkey River.

Water Supply.--Mostly surface drainage; many farm drains, as at Sta. 16.

Pollution.--Is suspected at Alpha from a rendering plant. The stream was examined here by Salyer and Mark in July, 1932. Although Mark got a high test for dissolved oxygen (8.1 p.p.m.) in the creek, Salyer thought that the pollution might be more severe than indicated by this test and examination. Mark's report follows:

"The Alpha Rendering plant owned by C.W. Bentley discharges floor washings and cooked liquor after settling into a small creek that runs into Crane Creek less than 100 yards away. The bottom of the small creek has a white and greenish colored growth. Small fish were seen in both the small creek and Crane Creek. The small creek is about 6 ft. wide and the Crane about 40 ft. The plant discharge, after grease is skimmed off, amounts to about 6 to 8 barrels a day. I think the pollution is not serious at this time. I recommend that he skim daily instead of biweekly."

(signed) Wm. R. Mark Jr

Dam.--One, at Alpha.

Temperature.--This is probably a fairly warm stream. Our only temperature (69° F) was taken early, 8 A.M., July 8 (air 74°).

Water.--Silty after rains; cleared over night (July 7-8).

Width.--Where running 12 to 15 ft., at Sta. 15; 20 to 30 ft. at Sta. 16.

Depth.--6 to 10 inches at Sta. 16.

Pools.--Up to 4 ft. deep in running section; a deep pool 40 ft. wide and almost a mile long by bridge of Highway 59.



Bottom.--At Sta. 15, muddy in the big pool, nice gravel in current; at Sta. 16, sandy.

Cover.--Snags plentiful at Sta. 15.

Predators.--Several green herons seen (probably not very destructive).

Fishing.--This stream is generally held to be small-mouth bass stream, and local residents want it maintained as such.

Game Fish.--Green and orange-spotted sunfish were seined at Sta. 15.

Forage Fish.--Minnows, shiners and darters abundant at Sta. 15.

#### Recommendations

Stocking.--Small-mouth bass fingerlings. The very large pool at Highway 59 crossing should be stocked with bullheads and catfish.

Cover.--Some snags and undercut banks at Sta. 17 (average 5 or 6 rods).

Predators.--Water snakes found common; also some green herons.

Game Fish.--Small-mouth bass, green and orange-spotted sunfish found at Sta. 17.

Spent some time caught in this stream at Little Turkey (thought to be escapes from private creek (Goddard's Creek)). There are many reports of trout with in the Little Turkey.

Game Fish.--Shiners and red-bellies abundant at Sta. 17.

Forage Fish.--Shiners, shiners, minnows and darters abundant at Sta. 17.

#### Recommendations

Stocking.--Do not think the evidence justifies treating the Little Turkey as a trout stream. It seems fit for small-mouth bass, however, and should be well stocked with this species.



## LITTLE TURKEY RIVER

Howard, Chickasaw and Fayette counties

Examined by Salyer at Sta. 17 on July 8, 1932, at 9:00 A.M., at Little Turkey.

Water Supply.--Largely surface drainage; many springs or seepages at Sta. 17.Dam.--One, at Waucoma. frequent in upper 2 miles of creek. Last year (1931)Temperature.--73° F at 9:00 A.M. on July 8 (air 80°). Doubtless gets much warmer on hot afternoons.Water.--Silt after rains, but clears quickly.Width.--Averages 15 to 20 ft. at Sta. 17.Pools.--Some good holes up to waist-deep at Sta. 17.Bottom.--Sand and gravel at Sta. 17.Cover.--Some snags and undercut banks at Sta. 17 (snags every 6 or 8 rods).Predators.--Water snakes found common; also some green herons.Game Fish.--Small-mouth bass, green and orange-spotted sunfish found at Sta. 17.

Trout sometimes caught in this stream at Little Turkey (thought to be escapes from private creek (Goddard's Creek). There are many reports of trout with in the Little Turkey.

Coarse Fish.--Shiners and red-horse abundant at Sta. 17.Forage Fish.--Chubs, shiners, minnows and darters abundant at Sta. 17.Recommendations

Stocking.--We hardly think the evidence justifies treating the Little Turkey as a trout stream. It seems fit for small-mouth bass, however, and should be well stocked with this species.



## BOHEMIAN OR PROTIVIN CREEK

Howard and Winneshiek Counties

Examined by Salyer at Sta. 18 on July 8, 1932, about 3 miles east of Protovin.

Tributary to.--Turkey River (entering east of Protovin).

Water Supply.--Springs frequent in upper 2 miles of creek. Last year (1931) creek dried up so pools were disconnected--for first time in 16 years, it was said.

Dam.--About 4 miles up from mouth, owned by Protovin Outdoor League.

Use of Water.--Public Fishing allowed for 4 miles (on request of farmers).

Temperature.--62° F at 11:30 A.M., July 8 (air 82.5° F).

Width.--15 to 30 ft. at Sta. 18.

Pools.--Holes and deep, long pools up to 3 or 4 feet deep.

Bottom.--Good: rock and **rabble**.

Natural Food.--Good.

Fishing.--Although this stream looks like a bass creek, wonderful success has been had here with rainbow trout (commonly caught up to 2 to 4 pounds). Good production is reported for the dammed pond. Brown trout were planted in 1932 (local report).

Recommendations

Stocking.--This stream should be heavily stocked with brown and rainbow trout of legal or near legal size, at the beginning of the season and when needed.



WEST FORK OF TURKEY RIVER

Howard County

Examined by Salyer on July 7, 1932, at 7:00 P.M., where crossed by Highway 9.

Tributary to.--Turkey River (one of two forks).

Temperature.--On July 7 at 7:00 P.M.: 74.5° F (air 75° F). The pools here would doubtless become much warmer on hot days.

Current.--A succession of grass-grown pools.

Shade.--Pools open and sunny.

Vegetation.--Pools grass-grown.

Game Fish.--No evidence of trout could be found, although they are reported to be here.

Notes.--A soft-shelled turtle killed here.



## EAST FORK OF TURKEY RIVER

## Howard County

Examined by Salyer, July 7, 1932, at 6:45 P.M., near head, where crossed by  
 Highway 9 above Cresco.

Tributary to.--Turkey River (one of two branches).

Temperature.--On July 7, 6:45 P.M.: 74° F (air 75° F). The stream would  
 doubtless become warmer on hot days.

Current.--The stream here is a succession of pools.

Bottom.--Deep silt and sand.

Vegetation.--Pools grass-grown.

Predators.--A soft-shelled turtle killed here.

pollution at Cresco was suspected, Mark found the B.O. here in July, 1932 to be

12.5 p.p.m.

and Dam.--Kilmer, Clement, Ft. Atkinson, Spillway (two), and at Vernon south of

Cresco. The upper Spillway Dam is 4' x 150', and backs up water 3 miles; its

fishway was found to be dilapidated. The Kilmer Dam (about 12' x 200') has no

fishway. Clement Dam (about 12' x 150') with fishway found out of commission and

shaded with brush, barely in water at bottom, and the first 4 feet almost vertically

height of this dam increased 3 feet by boards (this dam examined July 8 by Salyer).

Surrounding Country.--Much open pastureland, as far miles about Sta. 12;

grassy, rolling pastureland at Sta. 12.

Temperature.--This is obviously too warm a stream for young trout, though

adult trout can live in it, especially in the spring. Both below and above the

Spillway Dam the temperature of the water was 73° F on July 7 at 2 P.M. (air

80° F); at Clement Dam, water 74° F and air 84° F on July 8.

Water.--Easily roiled after storms.

Current.--Sluggish at Sta. 12.

Width.--40 ft. at Sta. 12; 15 to 25 ft. at Sta. 13; 20 to 35 ft. at Sta. 14.



## TURKEY RIVER

Howard, Winneshiek, Fayette and Clayton counties

Examined by Salyer on July 7, 1932 at following stations: Sta. 19, Spillville, Winneshiek County; Sta. 13, Sec. 2, T. 97 N., R. 10 W., Winneshiek County; Sta. 14,  $2\frac{1}{2}$  miles south of Cresco, Howard County, about highway bridge below Vernon Dam.

Further information obtained by Salyer and Hubbs from various sources.

Tributary to.--Mississippi River.

Water Supply.--Some spring water, but largely surface flow; floods over banks (as shown by drift at Sta. 13); there are said to be springs at Vernon Dam.

Pollution.--Ossian and Elkader pour sewage into the river, the former town after tank and sand treatment, the latter town after no treatment. Although pollution at Cresco was suspected, Mark found the D.O. here in July, 1932 to be 18.5 p.p.m.

Dams.--Elkader, Clermont, Ft. Atkinson, Spillway (two), and at Vernon south of Cresco. The upper Spillway Dam is 9' x 150', and backs up water 5 miles; its fishway was found to be dilapidated. The Elkader Dam (about 12' x 300') has no fishway. Clermont Dam (about 18' x 160') with fishway found out of commission and choked with trash, barely in water at bottom, and the first 4 feet almost vertical; height of this dam increased 3 feet by boards (this dam examined July 8 by Salyer).

Surrounding Country.--Much open pastureland, as for miles about Sta. 13; grassy, rolling pastureland at Sta. 12.

Temperature.--This is obviously too warm a stream for young trout, though adult trout can live in it, especially in the spring.. Both below and above the Spillwater Dam the temperature of the water was 73° F on July 7 at 2 P.M. (air 80° F); at Clermont Dam, water 76° F and air 84° F on July 8.

Water.--Easily roiled after storms.

Current.--Sluggish at Sta. 12.

Width.--40 ft. at Sta. 12; 25 to 35 ft. at Sta. 13; 30 to 35 ft. at Sta. 14.



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Depth.--At Sta. 12, long riffles and holes up to 5 or 6 ft. deep; at Sta. 13, generally 10 inches deep with holes 2 or 3 feet deep (also with holes cut under grassy banks); at Sta. 12, as deep as 4 feet; deep holes reported at Vernon Dam.

Bottom.--Shifting sand at Sta. 13; sandy silt with frequent extensive rock and boulder riffles at Sta. 12.

Cover.--A little driftwood in stream (as at Sta. 13).

Shade.--Spillway backwater well shaded; usually with only scattered shade (as at Sta. 12 and 13); shade provided in places by limestone bluffs, as for 20 rods at Sta. 12.

Natural Food.--Stones in stream bottom and dams (as at Spillway) with many black-flies and mayflies in short coat of Algae (Cladophora). Food fairly abundant at Sta. 12

Predators.--Such birds as green herons.

Fishing.--This river is reputed to be one of the main bass streams of the state. Some of its upper waters and feeders are trout streams. Farther down, as below the Elkader Dam, "fiddlers" and "pike" are also taken (Gmelin); also "crappie, yellow cats and yellow bullheads"; also "many bass, pickerel and channel cat." At Spillway small-mouth bass and northern pickerel are caught. Some small-mouth bass found at Sta. 13. Both black basses, many rock bass, bluegills and green sunfish were seined at Sta. 12.

Game Fish.--The few brook trout caught in river at Spillway are thought to be escaped from trout pond 1 mile east of town. Trout are reported by Jes Baur and others to be occasionally taken between Elkader and Clermont, though they must be regarded as spring wanderers only. Some northern pickerel are claimed to occur in the Turkey above Clermont ("often found in flood gates").

Coarse Fish.--Quillbacks are found at Spillway; suckers at Sta. 13; hog suckers and red-horse at Sta. 12.

Forage Fish.--Seining at Sta. 13 showed minnows and shiners to be common. At Sta. 12 chubs, shiners and darters were abundant.



### Recommendations

Stocking.--Small-mouth bass should be stocked in suitable places, such as Sta. 12 (2½ miles south of Cresco). The stream should not be planted with trout of any kind.

...tributary of the Mississippi, at Guy Hagill NE of Elkader, contains trout, according to Mr. Guelin of Elkader and others. Mr. Guelin reports good fishing last fall in the small feeder entering Guy Hagill Creek from the south, near its mouth.



*Smythe Hill*  
GUY MAGILL CREEK

Clayton County

Information obtained by Hubbs, August 8, 1932.

This direct tributary of the Mississippi, at Guy Magill NE of Elkader, contains trout, according to Mr. Gmelin of Elkader and others. Mr. Gmelin reports good fishing last fall in the small feeder entering Guy Magill Creek from the south, near its mouth.

A short distance downstream another branch joins with the one which flows by the falls. Below the junction the temperature is higher, 61.5°C (70.9°F), but there is a fine long deep pool beside a stone railroad grade, which should hold trout, at least brooks.

Reports were heard at Elkader that the stream has contained trout which have been raised out. Mr. Gmelin has tried his luck, but has taken only shiners.

This little stream is here an excellent prospect for stream improvement. There are many fine limestone slabs, available for "fish-house" covers. There is an abundance of material for small stone dams.

The stream calls for the stocking with about 500 large fingerlings or 100 adults, preferably of brook trout at present. After thorough improvement this number could be doubled. The creek by the falls floods at least 5 feet, as indicated by recent flood signs.



BLOODY RUN

Clayton County

Examined August 8, 1932, by Hubbs, near head of stream at and below the entrance of Beulah Falls (Sec. 21, T. 95 N., R. 4 W.).

This is a cool, clear creek in low-water stages. With an air temperature of  $25^{\circ}\text{C}$  ( $77^{\circ}\text{F}$ ) we found the branch just above the falls to be only  $17^{\circ}\text{C}$  ( $62.6^{\circ}\text{F}$ ). The falls, issuing from the bluff and dropping almost into the creek, registered  $9.6^{\circ}\text{C}$  ( $49.3^{\circ}\text{F}$ ). A short distance downstream another branch joins with the one which flows by the falls. Below the junction the temperature is higher,  $21.6^{\circ}\text{C}$  ( $70.9^{\circ}\text{F}$ ), but there is a fine long deep pool beside a stone railroad grade, which should hold trout, at least browns.

Rumors were heard at Elkader that the stream has contained trout which have been seined out. Mr. Gmelin has tried his luck, but has taken only chubs.

This little stream is here an excellent prospect for stream improvement. There are many fine limestone slabs, available for "fish-house" covers. There is an abundance of material for small stone dams.

The stream calls for the stocking with about 300 large fingerlings or 100 adults, preferably of brown trout at present. After thorough improvement this number could be doubled. The creek by the falls floods at least 5 feet, as indicated by recent flood signs.

Stocking.--Before improvement, about 200 yearling brook trout; after improvement, 500. To be replenished if or when caught out.

Predator Control.--Not recommended.

Spawning Bed Improvement.--Not needed.

Vegetation Increase.--Not needed.



BIG SPRING [CREEK]

Allamakee County

Examined by Salyer, July 8, 1932, and by Hubbs on August 5, 1932. Located in NE  $\frac{1}{4}$  of Sec. 11, T.96 N., R. 6 W.

Tributary to.--Yellow River.

Water Supply.--Largely formed by a group of large springs known as "Big Spring." Considerably flooded in spring--enough to overflow springs.

Dam.--Stone.

Shore.--Banks generally low.

Temperature.--Cold.

Water.--Easily roiled.

Width.--6 to 10 feet.

Bottom.--Soft shifting sand and stones--but generally hard, except in occasional mud piles.

Vegetation.--Much cress along margins.

Spawning Grounds.--Some fair gravel.

Game Fish.--Some trout.

Forage Fish.--Not seen.

Recommendations

Local Regulations.--Should be held open, as the river is none too good or sure for trout.

Stocking.--Before improvement, about 200 yearling brook trout; after improvement, 500. To be replenished if or when caught out.

Predator Control.--Not recommended.

Spawning Bed Improvement.--Not needed.

Vegetation Increase.--Not needed.



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Temperature Control.--Some willow planting would be helpful especially to hold down the temperature at the mouth of the creek, to make the Yellow River below more suited to trout.

Improvement Work Previously Done.--This is the site of the improvement work which the younger Albert claimed had already been done in Iowa (see Introduction). He claimed this work proved the impracticability of such work, as the constructions were soon buried in mud. We found one wholly inadequate little log held by one small stake, but not even wired to it; and found one mud pile that might have buried one or two similar feeble efforts. This amateurish attempt is no measure of improvement possibilities for this stream.

Improvement Work Recommended.--This nice little stream is capable of considerable improvement, and since it lies along the highway, would be a good stream to work on. The banks are generally low, but a considerable number of low dams could be installed to make pools 6 to 10 inches deeper. A series of underpass deflectors made of boards or sheet metal, to guage out good holes, is especially recommended.



TRIBUTARY TO YELLOW RIVER

Allamakee County

Examined by Salzer, July 8, 1932.

Tributary to.--Yellow River (entering from north side, 2 or  $2\frac{1}{2}$  miles below point where Highway 51 crosses Yellow River).

Water Supply.--The outlet of a number of springs.

Length.-- $\frac{1}{4}$  mile.

Vegetation.--Cress and water buttercups.

Game Fish.--Many trout fry in this run.

Recommendations

We consider this stream unfit for fish culture of any sort.



SOUTH BRANCH OF YELLOW RIVER

Winneshiek County

Examined by Salyer at junction with North Branch, just above county line, on  
July 8, 1932. Also by Tarzwell.

Water Supply.--Surface Water.

Surrounding Country.--Heads in open pastureland.

Temperature.--Warm

Water.--Silty.

Shade.--Unshaded.

Recommendations

We consider this stream unfit for fish culture of any sort.



1957

Search and right results

ith North Fork in Allamakee

junction with South Branch

...rears all the water runs i

### Recommendations

### Recommendations

44 for planting



## WEST BRANCH OF IOWA RIVER

Hancock and Wright counties, Iowa, Johnston,

Washington and Louisa counties

Examined by Salyer on July 17, 1932, in Hancock County, 2 1/2 miles east of Britt on U.S. 18 (Sta. 87). (See Hart's Report) examined by Salyer on July 12 at

Stream more or less dredged. 53); east of Eldora (Sta. 54), and at Alden

(Sta. 52). Shore.—Steep banks. 15 at power dam at Iowa Falls (Sta. 58); on July 17 at

Current.—Fast. (Sta. 55).

Average Width.—15 feet. included that "the Iowa River is unsatisfactory south from

Depth.—To 2 1/2 feet. This constitutes practically the entire stream. Tributaries

Bottom.—Deep silt deposit, with areas of exposed current. of stockings. "It is

Cover.—Undercut banks afford some shelter. is wastes rather than soil erosion

Shade.—None. waste". He thought that "the Iowa, one of our smaller rivers,

Game Fishes.—We seined only bullheads and green and orange-spotted sunfish. is

Forage Fishes.—Minnows and shiners common. peering the river at all points

available by road in the spring. Recommendations thousands of dead fish and a terri-

This branch did not appear worth much attention. encountered, these were just below

Belmond, where the waste from the Sugar Plant was being emptied into the river; below

Iowa Falls, at the quarry below Marshalltown; above Tama; at the dam inside the

Indian Reservation, and below Iowa City.

We heard that fishing at Alden was just recovering, following the killing of fish by wastes from sugar plants at Belmond.

Dam.—The old dam at Steamboat Rock is broken. A recently installed dam at Alden, 7 feet high x 235 feet long, makes a two-mile pond (fishway is 25 feet long; speaker reported seeing two carp go over). The dam at Iowa Falls, about 20 feet high and 250 feet long, has an impossible fishway. The dam at Belmond, about 4 feet high without slashboards, backs a basin which is largely silted up.



## IOWA RIVER

Wright, Franklin, Hardin, Marshall, Tama, Benton, Iowa, Johnston,

Washington and Louisa counties

Pollution information from Hart's Report; examined by Salyer on July 12 at Steamboat Rock, Hardin Co. (Sta. 53); east of Eldora (Sta. 54), and at Alden (Sta. 57), and on July 13 at power dam at Iowa Falls (Sta. 58); on July 17 at Belmond, Wright County (Sta. 86).

Pollution.—Mr. Hart concluded that "the Iowa River is unsatisfactory south from Belmond [Wright County]. This constitutes practically the entire stream. Tributaries are not of sufficient consequence to warrant any great degree of stocking." "It is a plain case of too much industrial and domestic wastes rather than soil erosion and agricultural waste". He thought that "the Iowa, one of our smaller rivers, carries, perhaps, the heaviest burden of pollution per unit volume of any river in the state". Mr. Hart wrote of thoroughly inspecting the river at all points available by road in the spring of 1931, finding thousands of dead fish and a terrific stench, where the most extreme conditions were encountered, these were just below Belmond, where the waste from the Sugar Plant was being emptied into the river; below Iowa Falls, at the quarry below Marshalltown; above Tama; at the dam inside the Indian Reservation, and below Iowa City.

We heard that fishing at Alden was just recovering, following the killing of fish by wastes from sugar plants at Belmond.

Dam.—The old dam at Steamboat Rock is broken. A recently installed dam at Alden, 7 feet high x 235 feet long, makes a two-mile pond (fishway is 25 feet long; Speaker reported seeing two carp go over). The dam at Iowa Falls, about 20 feet high and 250 feet long, has an impossible fishway. The dam at Belmond, about 4 feet high without slashboards, backs a basin which is largely silted up.



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Surrounding Country.—Various. Below Steamboat Rock are picturesque sandstone and limestone cliffs. East of Eldora the stream runs between sandstone cliffs, and for miles about Iowa Falls runs between high and abrupt limestone cliffs and ledges. Rolling, bare, hilly region near Belmond.

Temperature.—A warm stream: 87.5° F. at Sta. 57 on July 12 at 9:00 P.M., with air at 85° F; 76° F at Sta. 58 on July 13 at 8:00 A.M., with an air at 84° F; 79° F at Sta. 53 on July 12 at 5:25 P.M., with air at 90° F.

Water.—Clearing after rain when examined in Hardin County, turbidity in new pond at Alden is partly laid to outboard motors churning up bottom. In this region river clears sufficiently for fly fishing.

Width.—50 feet at Belmond.

Bottom.—At Sta. 53, clean, rock, gravel and sand. At Sta. 54, rock and gravel. At Sta. 57, rock (for 1 1/2 miles above Alden dam).

Bayous.—Few along upper part of river. River meanders greatly in Wright County, but without producing much ox-bow water.

Shade.—Good at Sta. 53; no trees at Sta. 86.

Fishing.—Testimony would indicate that this stream has some small-mouth bass or is more or less fit for that species from Belmond to Steamboat Rock. A considerable number of small-mouth bass said to be taken above the old dam at Steamboat Rock. We saw a string of black bullheads which had been caught below the dam. Good pickerel fishing abound Belmond. The new pond at Alden is heavily fished; crappies up to 14 inches long are reported here; some small-mouth bass reappearing here. Channel cat occur at Iowa Falls (seined).

Rough Fish.—The lower Iowa is said to be somewhat less saturated with carp than the lower portions of the Wapsipinicon, Cedar and Des Moines rivers. Suckers, redhorse and quillback are common in the river at Iowa Falls (seined at mouth of creek).

Forage Fish.—Speaker found many shiners (Notropis whiplii spilopterus) below fishway of Alden dam on former visit (fish seen by Hubbs), several blunt-nosed



minnows dip-netted above fishway on our visit. Shiners and minnows seined in creek mouth at Iowa Falls.

### Recommendations

Stocking.--The river requires further study, but for most of its length, Mr. Hart's admonition seems to be sound. It is "no applications for fish should be honored until steps are taken for a general cleanup of the river." However, about Steamboat Rock and Eldora and above Alden, up to Belmond, we found the river to be in the best shape of any of the major Iowa rivers. Some stocking with small-mouth bass above Steamboat Rock would seem justified. Certainly stocking with catfish, crappies, etc. above the dams in Hardin and Wright counties is called for.

Pollution.--The Fish and Game Department ought to keep behind the movement to clean up this river. "The major offenders", Mr. Hart concluded, "are the American Beet Sugar Paltn at Belmond, the City of Marshalltown, and the city of Iowa City".

Pools.--Few deep holes near Ogden.

Bottom.--Former gravel and rock bottom has largely been smothered by sand, though a considerable amount of hard bottom is left.

Natural Food.--Plentiful; very good considering limited amount of solid bottom now available; stoneflies, mayflies, even quite a few of stoneflies and some mayflies; crayfish plentiful.

Fishing.--This was by all evidence formerly a superior small-mouth bass stream. It is held to have deteriorated much in recent years, though still inhabited by a surprising number of small-mouths. Good fishing is reported by some. The fishing section is said to cover 4 or 5 miles of the creek near Ogden, and about 10 miles below town.

Game Fish.--The commonness of small-mouth bass was confirmed by our seining.

Rough Fish.--Suckers, hog suckers and red-horse fairly common.

Forage Fish.--Minnows, chubs, shiners and darters.



## BUFFALO CREEK

Fayette, Buchanan, Delaware, Linn and Jones counties

Examined by Salyer on July 10, 1932, at Coggen.

Tributary to.--Wapsipinicon River.

Pollution.--A creamery at Coggen runs wash into stream, but offered to stop practice if state wishes to improve stream.

Dam.--Formerly one at Coggen, of crib type, allowing one to go up river 3 miles in a boat. A 5-foot dam in Prairieburg.

Temperature.--This is obviously a moderately warm stream. On July 10, 11:00 A.M., the water was at 76° F when the air registered only 84° F.

Water.--Stream clears in 2 or 3 days after heaviest rain; clear to mouth.

Width.--Averaging 20-25 ft. at Coggen.

Pools.--Few deep holes near Coggen.

Bottom.--Former gravel and rock bottom has largely been smothered by sand, though a considerable amount of hard bottom is left.

Natural Food.--Plentiful; very good considering limited amount of solid bottom now available: stoneflies, mayflies, even quite a few of Sialis and some micro-caddis; crayfish plentiful.

Fishing.--This was by all evidence formerly a superior small-mouth bass stream. It is held to have deteriorated much in recent years, though still inhabited by a surprising number of small-mouths. Good fishing is reported by some. The fishing section is said to cover 4 or 5 miles of the creek near Coggen, and about 10 miles below town.

Game Fish.--The commonness of small-mouth bass was confirmed by our seining.

Rough Fish.--Suckers, hog suckers and red-horse fairly common.

Forage Fish.--Minnows, chubs, shiners and darters.



### Recommendations

Improvement.--This bass stream is one of the very best prospects for improvement of any in the state--probably second only to the Volga. One good reason for making a good bass stream out of Buffalo Creek is the large number of the better class fishermen in the towns within a close radius who would thus be served. Distances are as follows: Manchester, 16 miles; Monticello, 20 miles; Anamosa, 22 miles; Cedar Rapids, 25 miles; Vinton, 35 miles; Waterloo, 60 miles.

Deflectors are needed to accelerate the current and uncover the good bottom, and small dams are needed to make pools. Uncovering the gravel should greatly increase the food (see above). A fair amount of rock is available for small stone dams and deflectors, and business men of Coggen offer to haul all needed.

Dam.--From a fishing standpoint, reconstruction of the Coggen Dam, or building of another dam on this creek should be encouraged. Some of the business men of Coggen want a dam and a small park located there, at site of old dam. From the fishing standpoint, this would not be so important if the stream were thoroughly improved. The park-site, merely a small grove of trees in the corn fields, is not much to be recommended. I have small-mouth bass creek.

Game Fish.--He coined a pumpkinseed sunfish in addition to small-mouth bass fingerlings.

Coarse Fish.--Hog suckers

Forage Fish.--Cubs, shiners, minnows, darters.

### Recommendations

Stocking.--Small-mouth bass fingerlings.

Improvement.--This stream would probably be a good prospect for small stone dams associated with covers above, to provide shelter in pools for the bass.



PINE CREEK

Buchanan County

Examined by Salyer on July 11, 1932.

Information from W.R. Mark (on pollution) and from Olwein sportsmen, given

Tributary to---Wapsipinicon River (below Independence).

Salyer in July, 1932.

Temperature---A moderately cool stream--70.5° F at 11:00 A.M., July 11 (air 82° F).

to have a rather thorough sewage treatment. Railroad waste from the Chicago and

Water---Silts after rain.

Great Western shop here is reported as a polluting source, but one July test by

Length---"12 miles (of good water)."

W.R. Mark (made for us in 1932) showed 7.9 p.p.m. of dissolved oxygen. Olwein

Width---Average, 10' to 15'.

sportsmen claim that about 14 years ago (that is, about 1918), the railroad turned

Pools---"Deep holes."

loose a barrel of oil, killing all the bass in the ponded water below town, which

Bottom---"No silt." Sandy, with many stones.

was then reported to provide the best large-mouth bass fishing in this region.

Cover---Some snags.

Shade---Fair.

a fishway. Another dam at Olwein backs up water one mile.

Natural Food---Good where few lodging places exist; also many crayfish and

forage fish.

Game Fish---"Pickerel and small-mouth." "Good small-mouth fishing" is a very

Fishing---"Good small-mouth bass fishing"--considered best in the region. We

general report.

regard this as a typical Iowa small-mouth bass creek.

Game Fish---We seined a pumpkinseed sunfish in addition to small-mouth bass fingerlings.

Coarse Fish---Hog suckers

Forage Fish---Chubs, shiners, minnows, darters.

Recommendations

Stocking---Small-mouth bass fingerlings.

Improvement---This stream would probably be a good prospect for small stone dams associated with covers above, to provide shelter in pools for the bass.



OTTER CREEK

Fayette and Buchanan counties

Information from W.R. Mark (on pollution) and from Olwein sportsmen, given  
Examined locally by Salyer on July 11, 1932.

Salyer in July, 1932.

Pollution.--Olwein is the only town of consequence on this creek. It is said

to have a rather thorough sewage treatment. Railroad waste from the Chicago and

Great Western shop here is reported as a polluting source, but one July test by

W.R. Mark (made for us in 1922) showed 7.9 p.p.m. of dissolved oxygen. Olwein

sportsmen claim that about 14 years ago (that is, about 1918), the railroad turned

loose a carload of oil, killing all the bass in the ponded water below town, which

was then reputed to provide the best large-mouth bass fishing in this region.

Dam.--The owner of the mill dam  $1\frac{1}{2}$  miles south of Hazleton refuses to put in  
a fishway. Another dam at Olwein backs up water one mile.

Length.--"12 miles of fishable water."

Game Fish.--"Pickerel and small-mouth." "Good small-mouth fishing" is a very  
general report.



13  
Little Wapsipinicon R.  
Wapsipinicon R.

## LITTLE WAPSIPINICON RIVER

Source, Fair BUCK CREEK

Examined Bremer, Blackhawk and Buchanan counties

Examined hastily by Salyer on July 11, 1932.

Tributary to.--Little Wapsipinicon River, (entering near mouth).

Temperature.--A warm stream: 78° F at 2:30 P.M., July 11, when air was only 84° F.

Notes.--Bentley Feed Mill Dam at Fairbanks is about 9' x 110', has an average head. This small and muddy stream is not very good, and is said never to have contained many fish. About 1/2 mile long; dam without fishway.

Temperature.--This is a warm stream. Recommendations with air at only 82° F, 1:30 P.M.,

July Stocking.--None recommended for present.

Fishing.--About 20 miles of small-mouth bass water.

Game Fish.--When water is high there are said to be bass and many catfish in the Fairbanks Pond. Residents at Fairbanks claim they have locally channel and mud cats, large- and small-mouth bass and bluegills.

Game Fish.--Carp said to be very numerous in Fairbanks Pond; locally also suckers and red-horses.

### Recommendations

Stocking.--Small-mouth bass in general; crappies, bluegills, bullheads, etc. in Fairbanks Pond.

Fishway.--The Fairbanks Dam should be provided with a fishway, preferably one of the new fish lifts.

Game Fish Removal.--Carp weeding in Fairbanks Pond desirable. Local folks offer to do the work if seine is furnished.



## LITTLE WAPSIPINICON RIVER

Bremer, Fayette and Buchanan Counties

Examined by Salyer at Fairbanks, on July 11, 1932

Water Supply.--Largely surface water, but some spring water--several springs feeders around Fairbanks.

Pollution.--The Mill at Fairbanks was dumping oat hulls when examined.

Dam.--Bentley Feed Mill Dam at Fairbanks is about 9' x 110', has an average head of 8 feet, is 170 miles from Mississippi River, has a drainage area of 152 sq. mi., and forms a lake about  $\frac{1}{2}$  mile long; dam without fishway.

Temperature.--This is a warm stream: 78° F with air at only 82° F, 1:20 P.M., July 11.

Fishing.--About 20 miles of small-mouth bass water.

Game Fish.--When water is high there are said to be bass and many catfish in the Fairbanks Pond. Residents at Fairbanks claim they have locally channel and mud cats, large- and small-mouth bass and bluegills.

Coarse Fish.--Carp said to be very numerous in Fairbanks Pond; locally also suckers and red-horse.

Recommendations

Stocking.--Small-mouth bass in general; crappies, bluegills, bullheads, etc. in Fairbanks Pond.

Fishway.--The Fairbanks Dam should be provided with a fishway, preferably one of the new fish lifts.

Coarse Fish Removal.--Carp seining in Fairbanks Pond desirable. Local folks offer to do the work if seine is furnished.



CRANE CREEK

Bremer and Blackhawk counties

Examined by Salyer, at Dunkerton, on July 11, 1932.

Tributary to---Wapsipinicon River.

Temperature---A warm creek: 81° F with air at only 86° F, 4:00 P.M., July 11.

Width---About 20 feet at Dunkerton.

Depth---Shallow.

Pools---Few holes.

Bottom---Sandy.

Shade---Poor.

Fishing---It is reported that bullheads only are caught.

Recommendations

Building stone dams will probably make this stream suitable for small-mouth bass.

Dams---We have received from the University of Iowa the following data on the dams in the Wapsipinicon River.

Town	Miles from Miss. River	Drainage Area	Elevation above sea level & above dam	Elevation above sea level be- low dam	Head av.	Nr. of Dams	Pond area
Buena Vista	37.4	2086			5		
Toronto	53.5	1839			-		
Oxford Mills	64.9	1791	715.6	702.3	3.3	242	10
Newport Mills	66.7	1756			7		
Akansas	93.6	1583			8		
Central City	115.4	1086	823.4	812.1	1	143	25
Troy Mills	127.2	1220			7.5		
Quasqueton	132.4	1145			6		
Independence	150.2	1052	839.1	826.1	13.0	225	30



## WAPSIPINICON RIVER

Mitchell, Howard, Chickasaw, Brexer, Blackhawk, Buchanan, Linn, Jones,

Cedar, Clinton and Scott counties

Inspected at several points, and information gained by Salyer in July, 1932.

Examination about Independence and west of Fairbanks, on July 11, and near head,

2 miles north of Riceville, Mitchell County, on July 13.

Flooding.--Bad, even in headwaters (had recently been out of banks near Riceville when examined).

Pollution.--The river is reputed to be definitely polluted only below Independence, which dumps raw sewage into river. A July dissolved oxygen taken for us here by W.R. Mark, however, showed 8.1 p.p.m. below the last sewer. In addition to city sewage, there is gas plant pollution here. Although the gas plant has a separator, this seems to be laxly used. The rendering plant here seems to be well operated; no debris, no odor. July 11 the river was very turbid at Independence.

Dams.--We have received from the University of Iowa the following data on the dams in the Wapsipinicon River.

Town	Miles from Miss. River	Drainage Area	Elevation above sea level a- bove dam	Elevation above sea level be- low dam	Head av.	Ht. of Dam	Pond area
Buena Vista	37.4	2086			5		
Toronto	55.6	1839			-		
Oxford Mills	66.9	1791	715.6	709.3	5.8	242	10
Newport Mills	86.7	1756			7		
Anamosa	95.6	1563			8		
Central City	115.4	1268	822.4	812.1	1	148	25
Troy Mills	127.2	1220			7.5		
Quasqueton	138.4	1145			6		
Independence	150.2	1052	899.1	886.1	12.5	225	30



Shade.--None (north of Riceville); fair (west of Fairbanks).

Littleton	159.8	901	7
Frederika	197.0	361	7
Riceville	246.4	71	9
S.W. of McIntire	253.0	33	8

We found the dam at Independence (about 12' x 100') to have fishway dry; also to have intake screen much too coarse--merely vertical bars spaced 4" apart.

Temperature.--A warm stream--water at 76° F when air was only 80° F at 9:30 A.M., July 11; above Riceville, 88.5° F when air was 89.5° F at 5:00 P.M., July 13.

Water.--The middle section (Buchanan, Linn, Jones counties) the water is reputed to be clear or clearing in July. "Clear," of course, is a general term. We found the river at Central City to show the typical turbidity of the lower stretches of the lower Iowa rivers at this season. The fly can barely be used on the riffles. From here on down the turbidity is nearly permanent, though said to clear somewhat late more in August. On July 11 the river was very turbid at Independence.

Width.--Average north of Riceville only 15 feet; average west of Fairbanks in 2 parallel branches, 50 feet each.

Depth.--Only 6 to 10 inches north of Riceville; up to 3 or 4 feet west of Fairbanks.

Pools.--Few (west of Fairbanks).

Bottom.--Sandy, with rocks and riffles, west of Fairbanks. In the middle section of the river from about Independence to Oxford Mills (that is, in Buchanan, Linn and Jones counties) the bottom is rocky and sandy. Toward the head (as north of Riceville), the bottom is of very silty sand, one sinking 2 or 3 inches at every step.

Cover.--None (north of Riceville); none except for undercut grassy banks (west of Fairbanks).



Shade.--None (north of Riceville); fair (west of Fairbanks).

Natural Food.--Scarce near head (north of Riceville); good (west of Fair-

banks).

Predators.--Kingfishers (1 seen north of Riceville).

Game Fish.--Wall-eyes are reported by local anglers to occur in the "Wapsi"

west of New Hampton. Olwein fishermen claim that the wall-eye fishing at Indepen-

dence was good this year (1932). (On fish of Bagott's Slough above Independence

see Lake Report). Several catfish were seen at Independence (with broken tails).

Good crappie fishing in the river near Independence is reported. Northern pickerel,

rock bass, green sunfish, catfish and bullheads are reported caught west of Fair-

banks, or were seined by us. The only thing approaching a game fish seined by us

in the headwaters north of Riceville was the orange-spotted sunfish.

Rough Fish.--The lower course said to be saturated with carp. A diseased carp of 15 lbs. was taken at Independence. Carp said to be numerous as far up as west of Fairbanks. Also suckers and quillbacks there. Suckers seined in headwaters north of Riceville.

Forage Fish.--Chubs, minnows and shiners seined west of Fairbanks; chubs, minnows, darters and shiners seined near head.

#### Recommendations

Law Enforcement.--More stringent enforcement would seem desirable, as we heard of alleged violations (such as dynamiting about Fairbanks and Littleton).

Fishway and Screen, Independence Dam.--This fishway ought to be kept in working condition so river fish can run this stream. A screen in place of the bars spaced 4 inches should be insisted upon at this dam.

Pollution Control.--We recommend that the Department favor the treatment of sewage and gas wastes at Independence and help stop the dumping of oat hulls at Fairbanks.



Stocking.--This stream and its tributaries should be well stocked with small-mouth bass. The mill ponds should be given in addition a good stocking with large-mouth bass, crappies, bluegills and catfish.

The extreme upper portion of the stream, in Mitchell and Howard counties, is about worthless. Like all the large Iowa rivers, this one heads in an open prairie region, and becomes increasingly better toward the south.

This seems to be an excellent trout project (Mr. Lee found a drop in temperature of only 1° F in 4 miles). We recommend that this stream be well stocked with brook trout as a trial. Brook trout are recommended because they are least likely to drop down into the Mississippi River.



40  
Catfish Cr.  
Mississippi R.

SWISS VALLEY CREEK

Dubuque and Jackson Counties  
Dubuque County

Information given by Mr. Moe.  
Tributary to.--Catfish Creek (south of city).

Tributary to.--North Branch of Des Moines R.

Recommendations

Game Fish.--Small-mouth bass fishing.

This seems to be an excellent trout project (Mr. Moe found a drop in temperature of only 1° F in 4 miles). We recommend that this stream be well stocked with brook

Stocking.--Small-mouth bass fingerlings.  
trout as a trial. Brook trout are recommended because they are least likely to drop

Improvement.--This stream very much needs improvement work.  
down into the Mississippi River.



LYTLE CREEK

Dubuque and Jackson counties

This little tributary of the North Branch of the Maquoketa was studied in  
Information given Salyer by Mr. Moe.

Tributary to.--North Branch of Maquoketa R.

Game Fish.--Small-mouth bass fishing.

Recommendations

Stocking.--Small-mouth bass fingerlings.

Improvement.--This stream very much needs improvement work.

The current is swift near head of canyon; the water is clear, somewhat foiled  
after rains but not increasing much in temperature at such times. The bottom is  
generally of limestone upstream, and of sand to mud downstream. Near the mouth  
there is little current except on a few short riffles. There is little vegetation  
in the creek.

This stream appears best suited to rearing pond development, and it is so  
dealt with in the report on hatchery site examinations. If it is not used for that  
purpose, it could be made to hold a fair number of trout--especially if small stone  
dams and holding basins were installed.



OZARK SPRING CREEK

Jackson County

This little tributary of the North Branch of the Maquoketa was studied in detail by Hubbs and Moe on August 6, 1932.

It is about  $\frac{1}{4}$  mile long, originating in large spring at the head of a narrow valley, which receives relatively little flood water. Temperature at spring head  $11.2^{\circ} C = 52.2^{\circ} F$ , and at lower end of creek  $16^{\circ} C = 61^{\circ} F$ ; air  $22.5^{\circ} C = 72.5^{\circ} F$ .

The current is swift near head of canyon; the water is clear, somewhat roiled after rains but not increasing much in temperature at such times. The bottom is generally of limestone upstream, and of sand to mud downstream. Near the mouth there is little current except on a few short riffles. There is little vegetation in the creek.

This stream appears best suited to rearing pond development, and it is so dealt with in the report on hatchery site examinations. If it is not used for that purpose, it could be made to hold a fair number of trout--especially if small stone dams and holding basins were installed.

Stocking.--This stream is regarded as unsuited to trout. It is recommended it be well stocked with small-mouth bass fingerlings.

Improvement.--The North Branch could be greatly improved if deflectors and small dams can be built to withstand the floods. Not much rock is available except as this could be blasted from limestone cliffs.



## NORTH FORK OF MAQUOKETA RIVER

Delaware, Dubuque, Jones and Jackson counties

Examined by Hubbs, August 6, 1932, near mouth of Ozark Spring Creek, Brandon

Township (85 N., 1 W.). Other information from Mr. Moe.

Temperature.---Where examined August 6:  $22.7^{\circ}\text{C} = 72.9^{\circ}\text{F}$ ; air  $22.5^{\circ}\text{C} = 72.5^{\circ}\text{F}$ .Water.---Water is moderately clear even after rains.Width.---This stream, where examined by Hubbs, was found to be 34 yards wide.Depth.---The usual depth was about 6 inches, somewhat deeper along the outer

swing of the curves, but grading up into mud flats on the protected side of curves.

Bottom.---In general, sand.Fishing Reputation.---This stream gives every impression of having been a fine bass stream before it became choked with sand. It is generally reputed that bass are still caught in the pools which remain, downstream about as far as Fulton. Upstream there is said to be better water, in Jones, Dubuque and Delaware counties, up about as far as Dyersville.RecommendationsStocking.---This stream is regarded as unsuited to trout. We recommend it be well stocked with small-mouth bass fingerlings.Improvement.---The North Branch could be greatly improved if deflectors and small dams can be built to withstand the floods. Not much rock is available except as this could be blasted from limestone cliffs.



PLUM CREEK

Evidence obtained by Hubbs and Moe, August 6, 1932.

Tributary to.--Maquoketa River.

According to local anglers at Hopkinton Dam, there are no trout in this stream, but chubs are obtained for fishing in the river.

A very cursory examination of the stream confirmed this view.



BUCK CREEK

Delaware County

Evidence obtained by Hubbs and Moe, August 6, 1932. Also by Hubbs on August 7,

Tributary to.--Maquoketa River.

According to local anglers, at Hopkinton Dam, there are no trout in this stream, but chubs are obtained for fishing in the river. It is very heavily

A very cursory examination of the stream confirmed this view. A road cut along the hatchery, though some of course drop down to the lower course of the stream which has feeds into the backwater from Delhi Dam on the Maquoketa. The trout caught in the pond above this dam, especially in the late spring and early summer, are also presumably from this source.

Question has arisen as to the closing of this stream. Obviously the wishes of the Federal Hatchery should be considered, especially as to closing on the hatchery grounds. Since the Delhi Pond is hardly trout water except early in the season, and since the Pond is posted until June 15, it would seem undesirable to regard the creek as a "feeder stream." Our recommendation is that the stream be held open from the lower boundary of the hatchery grounds to its mouth. With improvement trout could be tempted to remain in this stretch, and fine fishing should result.



# SPRING BRANCH

Delaware County

This tributary of the Maquoketa River was examined briefly by Hubbs on August 7, 1932, at the Federal Fish Hatchery near Manchester.

It is a fine little trout stream, with a good current of clear cold water, flowing at varying speeds and with a large amount of cress. It is very heavily stocked with rainbow trout from the hatchery. These fish largely hold out along the hatchery, though some of course drop down to the lower course of the stream which now feeds into the backwater from Delhi Dam on the Maquoketa. The trout caught in the pond above this dam, especially in the late spring and early summer, are also presumably from this source.

Question has arisen as to the closing of this stream. Obviously the wishes of the Federal Hatchery should be considered, especially as to closing on the hatchery grounds. Since the Delhi Pond is hardly trout water except early in the season, and since the Pond is posted until June 15, it would seem undesirable to regard the creek as a "feeder stream." Our recommendation is that the stream be held open from the lower boundary of the hatchery grounds to its mouth. With improvement trout could be tempted to remain in this stretch, and fine fishing should result.



HONEY CREEK

(The Hatchery branch is in Boone State Park).

Clayton and Delaware counties

Tributary to.--Maquoketa River.

Information gleaned by Salyer and Hubbs, especially from Mr. Moe.

Pollution.--The dirt and oil from cars on the four fords became serious on big

Tributary to.--Maquoketa River at Manchester.

Park boys. This is especially bad on account of the hatchery.

Temperature.--Found by Moe to be fairly warm.

Temperature.--This is throughout a very cold branch. We took the following

Bottom.--Sandy toward mouth at least.

Temperature:

Trout Conditions.--We concur in Mr. Moe's belief that this stream is probably

unfavorable for trout.

At spring head

July 9

48° F

At entrance to hatchery

July 9

51° F

At outlet from hatchery pond

July 9

55° F

Near mouth

Aug. 1

Predators.--Heron present (Salyer saw tracks and picked up two heron-marked trout).

Recommendations

Pollution Control.--The pollution of the stream by dirt and oil washed from cars on the four fords should be eliminated. We recommend the building of fills with culverts or of bridges.

Predators.--Fish-eating birds should be killed or driven off the hatchery grounds, but on account of their natural history interest should not be killed elsewhere along the branch (or river).



RICHMOND SPRING BRANCH OF MAQUOKETA RIVER

(The hatchery branch in Backbone State Park).

Tributary to.--Maquoketa River.

Pollution.--The dirt and oil from cars on the four fords become serious on big Park days. This is especially bad on account of the hatchery.

Temperature.--This is throughout a very cold branch. We took the following temperatures:

Location	Date	Water
At spring head	July 9	48° F
At entrance to hatchery	July 9	51° F
At outlet from hatchery pond	July 9	58° F
Near mouth	Aug. 1	

Predators.--Herons present (Salyer saw tracks and picked up two heron-marked trout).

Recommendations

Pollution Control.--The pollution of the stream by dirt and oil washed from cars on the four fords should be eliminated. We recommend the building of fills with culverts or of bridges.

Predators.--Fish-eating birds should be killed or driven off the hatchery grounds, but on account of their natural history interest should not be killed elsewhere along the branch (or river).



WEST OR SOUTH FORK OF MAQUOKETA RIVER

Fayette, Buchanan and Delaware counties

Seen by Salyer, July 1, 1932. Information largely from Mr. Moe.

Tributary to.--Maquoketa River (joins main branch in NW part of Delaware County).

Temperature.--Warm.

Fishing.--A few trout are taken between Aurora and Lamont.

Recommendations

Stocking.--We recommend no stocking of this branch.

Water Supply.--Bottom spring seepage in head-pools; many other springs and

spring feeders through upper half of stream, where it is not very badly flooded.

Pollution.--A number of towns contribute sewage to the Maquoketa, Preston,

Cascade and Potosi treat their sewage (tank treatment and salt filtration), but

Manchester, Monticello, Dyersville and Maquoketa do not. The rendering plant on the

upper pond at Manchester was closed when our examination was made (July 10, 1932).

The closing, we understand, was due to low prices. The indications of severe pollu-

tion here in the past are still evident. An active odor of putrefaction was noted.

The sanitary sewage of Manchester empties into a backwater just below the lower dam.

Dams.--There are two dams at Manchester. The lower of these backs up a one-

half mile pond, while the other produces a longer pond (about a mile long). The

power plants at the Manchester dams are shut off early in the morning, so that the

water clears sufficiently to permit fishing by 10 or 11 A.M. They are said to draw

the pond levels down 2 feet while operating.

The rather new dam at Delhi has produced a beautiful lake, with a reported head

of about 60 feet. The depth of the water and the rather cool river flowing into

the pond, further cooled by the spring creek coming in from the Manchester Hatchery,

make it possible for rainbow trout to inhabit this artificial lake in the early

summer at least. It is claimed also that there are springs in the bed of the lake.



There is also a 12-foot dam at MAQUOKETA RIVER

Supports Fayette, Clayton, Delaware, Jones and Jackson counties

(The east or north headwater fork is here treated as part of main river).

Examined by Salyer at Sta. 27 at head on U.S. 10 on July 1; at Sta. 30, Backbone Park, on July 9; at Sta. 31, Manchester, July 10. Examined by Hubbs and Moe on August 6, at Delhi Dam. (information from local parties, particularly from owner of the boat livery known as "Dam Camp," who appeared reliable); and at Hopkinton Dam (information from operator of power dam and from Mr. Keith, local cottager with wide fishing reputation).

Water Supply.--Bottom spring seepage in head-pools; many other springs and spring feeders through upper half of stream, where it is not very badly flooded.

Pollution.--A number of towns contribute sewage to the Maquoketa. Preston, Cascade and Farley treat their sewage (tank treatment and salt filtration), but Manchester, Monticello, Dyersville and Maquoketa do not. The rendering plant on the upper pond at Manchester was closed when our examination was made (July 10, 1932). The closing, we understand, was due to low prices. The indications of severe pollution here in the past are still evident. An active odor of putrefaction was noted. The sanitary sewage of Manchester empties into a backwater just below the lower dam.

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There is also a 10-foot dam at Hopkinton.

Surrounding Country.--Open prairie at head.

Temperature.--This stream heads in moderately cool, open, sandy pools. It soon picks up many springs and becomes satisfactorily cool in summer, and does not freeze here in winter. Near the lower end of Backbone State Park it approaches the safe upper limit for trout. In the Manchester region it is too warm in the summer for trout, but spring feeders, especially the Spring Branch from the federal hatchery, again cool it so that rainbow trout live in the river well into the summer. Formerly, the stream must have been cool even to Hopkinton, but the big dams above have probably ruined that condition permanently. Some 1932 temperature readings follow:

Location	Date	Time	Air	Water
Near mouth Richmond Spring Branch	Aug. 1	9:20 A.M.	65° F	62° F
4 miles above dam, in Backbone Park	July 9			72° F
Old dam, Backbone Park	July 9	6:00 P.M.	81° F	74° F
Manchester	July 10	10:30 A.M.	82° F	78° F

Water.--Normally clear in upper reaches; clears in 2 days after heaviest rain.

Current.--Sluggish at extreme head; then becomes fair to good; largely destroyed by dams in middle third of river course.

Width.--Averaging 15 ft. west of Strawberry Point.

Depth.--Shallow at head; much of water 2 ft. deep west of Strawberry Point; largely shallow in park.

Pools.--Fair holes in upper section about great pieces of limestone ledges which have fallen in.

Bottom.--Sandy at head; then sand and gravel for 14 miles, with some mud; rock near Manchester.



Cover.--Mostly confined to fallen fragments of limestone ledges. Some stumps  
west of Strawberry Point.

Shade.--None at head; becomes good (in places veritable jungles) somewhat  
farther down.

Game Fish.--Trout occur from the extreme head (where Moe seined a few young  
brown trout this winter) to below Delhi. The extreme head is not really good,  
however. West of Strawberry Point conditions for trout are good. In upper 14 miles  
1800 adult brook trout were seined when hatchery was built 7 years ago. Below lower  
limits of Backbone Park, bass, crappie, etc., appear. About Manchester the bass  
fishing is said to be not very good. The big flood of 1925 is said to have hurt  
the fishing; for one thing, many fish were stranded. Catfishing is said to be poor;  
channel cats are not supposed to do well here. Rainbow trout were caught in the  
Delhi Pond, near the dam, on the opening day this year (June 15). "Lots of trout"  
are reported below the dam, and trout are fished for a mile or a mile and a half  
downstream. Other fish reported caught are both species of black bass, crappies,  
perch, bluegills, sunfish and bullheads. Salyer heard that no walleyes have been  
caught.

The lake has been stocked very heavily. Last year 105,000 fish are said to  
have been brought in from Lansing. This year 1,000 5 to 15 inch catfish, 4,000  
bluegills, 7,000 crappies, and 150,000 fry and 15,000 fingerlings of wall-eyes are  
said to have been planted. Conditions seem especially favorable for small-mouth  
bass.

That the larger trout of the Maquoketa do not rely solely on the forage fish  
is illustrated by a report of Mr. M.F. Gunderson of Olwein, that he once caught here  
a 14-inch rainbow trout which had eaten two smaller fish of the same species, 2 and  
3 inches long.

The stocking with other species claimed to have been made in  
1932 is considered very generous, too much for annual stocking. The species and  
proportions are roughly satisfactory. It is probably true that no wall-eyes have



"Lots of trout" are reported to have been caught here above and below the dam at Hopkinton for 2 years after the state hatchery above was flooded out. A few had been caught before the flood. But since the large Delhi Dam has been built, warming the water and stopping the movements of trout up and down stream, it is very doubtful whether the river this far down can any longer be regarded as suitable for trout, even for large rainbow trout. No trout have been caught here this year. Fish caught here are mostly small bass, along with a few crappies and bluegills and some catfish. Fishing is not particularly good, according to reports.

Coarse Fish.--Suckers numerous. Reports have it that suckers sometimes die in the summer at Hopkinton Dam.

#### Recommendations

Special Regulations.--Delhi Pond was posted this year until June 15. This provision would seem wise, unless or until trout become abundant. The regulation is said to meet with local favor.

Some local requests for closing the upper river for a year after restocking should be ignored, as the stream should be stocked with legal or near-legal fish.

Law Enforcement.--Increased vigilance in law enforcement in this region seems called for. Thus we heard apparently trustworthy and conclusive indications of dynamiting trout in the river west of Strawberry Point.

Stocking.--This stream and its feeders should be heavily stocked with yearling trout--enough to keep fishing fair all season. This recommendation is made to apply whether or not a lake is built in the park.

The stocking of Delhi Pond with rainbow trout will be adequately cared for by adults drifting down from the Manchester hatchery. No fingerling trout stocking is recommended. We recommend the planting of several thousands small-mouth bass fingerlings when available. The stocking with other species claimed to have been made in 1932 is considered very generous, too much for annual stocking. The species and proportions are roughly satisfactory. It is probably true that no wall-eyes have



been caught, but there has hardly been time for a conclusive experiment as to the suitability of this pond for wall-eye.

Rather heavy stocking of the Manchester and Hopkinton ponds with Mississippi fish (catfish, large-mouth bass, bluegills, crappies, etc.), and with small-mouth bass fingerlings when available is recommended. Salyer believes blue and yellow cats would do better than channel cats.

Cover Increase.---The increase in cover along the stream is very important, and would add materially to its carrying capacity. This also applies to the stream as it is and as it would be if and where impounded.

Local feeling calls for hatcheries in the bayous of Delhi Pond. This appears quite impracticable. However, young fish in the lake need more protection, which can best be added by installing brush-shelter devices up the arms of the lake.

Spawning Facilities.---Since catfish are among the game fishes recommended for the ponds of this river, facilities for their spawning should be provided. We recommend as best suited to this purpose several hundred partially broken pieces of tile, to be placed on the bottom of the "lakes" at appropriate depths. Incidentally these will also serve as breeding places for certain minnows.

Shade Increase.---Whether or not a big pond is built in the park, more shade along the banks would be beneficial to the trout, and would better the appearance of the stream. This would apply to the sides of the pond as well as the running stretch.

Dam.---We recognize fully the advantages of a large, deep lake in the lower part of the park for swimming and boating, but believe that the idea of making a fine trout lake out of this pond would meet with greater popular favor, and would still provide some bathing and boating facilities. We believe that constructing a dam as high as proposed would make a lake too warm for trout fishing. The lower layers might stay cool, but the trout would stay there and refuse to rise in the summer--if indeed they would remain at all in the pond.



It is definitely reported that good trout fishing was experienced when the old dam was in operation, so that raising the level to that height would seem fairly safe. But before the dam went out it is reported that small-mouth bass were markedly increasing--indicating conditions toward the upper limit tolerable by trout. The very heavy planting of this lake with legal fish from the hatchery is a brilliant idea, to increase the popularity of the Park, and to serve the sport-loving public. To add materially to the height of the old dam would in all probability make this impossible.

We repeat our verbal opinion that planking up the opening in the old dam to restore its level, and building a secondary dam two feet higher in the old channel would be relatively a very cheap procedure. This would throw the spillwater over the old dam, which is very sound, and would make possible cheap construction in the side channel. Sheet piling imbedded in the solid limestone channel bed ought to be permanent. The building of a high dam in the old channel and materially raising the old dam would cost thousands in place of hundreds.



## LITTLE MAQUOKETA RIVER

Dubuque County

Information gleaned by Salyer, July, 1932.

Water.--Very clear.

Current.--Good flow above Durango.

Width.--Averaging 20 feet.

Pools.--Good.

Bottom.--"Rocky."

Cover.--Good.

Game Fish.--Has small-mouth bass and river-run fish.

By the time the river reaches the Spring Branch, which flows much more but  
trickles. Here at its mouth the Spring Branch flows  
swiftly over limestone riffles, with some pools. At the junction there is a large  
pool. Below this pool, in Sec. 15 (T. 90 N., R. 4 W.), this branch is much colder.  
By the time the river reaches the Spring Branch, which flows much more but  
trickles at 53.5° C = 74.3° F from a large surface-drainage gully. From here to  
the actual spring head, only a short distance, the stream is about 4 feet wide and  
4 inches deep, where rushing over a bottom of limestone stones. It flows in a  
secondary trench about 4 feet deep, in a main valley 100 feet wide by 10 feet deep.  
Here a small dam would create an excellent little trout lake, about 750 feet long  
and 100 feet wide, and about 10 feet deep at the dam.

By merely repairing the old mill dam, a second and higher pool could be formed,  
about 500 feet long, 20 feet wide and 15 feet deep at the dam. Being so narrow and  
deep, this lakelet would not greatly increase the temperature, delivering water still  
cold to the major pond below. At least it would seem to be a safe bet to plan the  
upper lake for brook trout and the lower one for rainbow trout.

There would remain a short stretch of running water with bottom excellent for  
spawning, above the upper pond, and just below the spring.

Just below the group of springs which unite to form the Spring Branch, the creek  
has a temperature of 9.2° C = 48.6° F, a width of 4 feet, bottom of stone and gravel,  
depth 5 inches and cross at sides.



Volga R.  
Turkey R.

FOUNTAIN SPRINGS BRANCH

Delaware County

Examined August 7, 1932, by Dr. Hubbs.

At its mouth, as just stated, this branch was found (at summer level) to carry several times as much water as Odell Branch, which floods much more but becomes reduced to a spring-fed trickle. Here at its mouth the Spring Branch flows swiftly over limestone riffles, with some pools. At the junction there is a large pool.

Toward its head in Sec. 16 (T. 90 N., R. 4 W.), this branch is much colder. By the old Fountain Spring Mill it stood at  $11^{\circ}\text{C} = 51.8^{\circ}\text{F}$ , where it receives a trickle at  $23.5^{\circ}\text{C} = 74.3^{\circ}\text{F}$  from a large surface-drainage gulley. From here to the actual spring head, only a short distance, the stream is about 4 feet wide and 4 inches deep, where rushing over a bottom of limestone stones. It flows in a secondary trench about 4 feet deep, in a main valley 100 feet wide by 30 feet deep. Here a small dam would create an excellent little trout lake, about 750 feet long and 100 feet wide, and about 20 feet deep at the dam.

By merely repairing the old mill dam, a second and higher pool could be formed, about 500 feet long, 20 feet wide and 15 feet deep at the dam. Being so narrow and deep, this lakelet would not greatly increase the temperature, delivering water still cold to the major pond below. At least it would seem to be a safe bet to plan the upper lake for brook trout and the lower one for rainbow trout.

There would remain a short stretch of running water with bottom excellent for spawning, above the upper pond, and just below the spring.

Just below the group of springs which unite to form the Spring Branch, the creek has a temperature of  $9.2^{\circ}\text{C} = 48.6^{\circ}\text{F}$ , a width of 4 feet, bottom of stone and gravel, depth 5 inches and cress at sides.



These springs have been suggested as a possible hatchery site, but the lay of the land is all against raceway construction. The trout ponds are the best plan for this branch, whether the project be undertaken publically or privately.

Unless or until the larger dams are constructed, it would seem desirable to stock this branch with a few hundred large fingerling trout, or adults if available. Constructing a series of small dams and holding basins would be easy, and should markedly increase the carrying capacity.

obtain a warm creek fauna and no trout by adding.

The water is moderately clear, but easily roiled. Some algae grow here. The bottom is of stones, clay and sand, and the shores are gravel slopes and clay banks. The stream, 15 to 40 feet wide, is a succession of swift riffles and quiet pools as deep as 7 feet.

Further upstream, however, we encountered waters which seem fit for trout. Thus Odell Branch just above the junction with Fountain Spring Branch had a temperature of  $18.8^{\circ} \text{C} = 66^{\circ} \text{F}$ , while the spring branch read  $20.5^{\circ} \text{C} = 69^{\circ} \text{F}$ , at 4:30 P.M. (See also Fountain Spring Branch, below).

When small-mouth bass fingerlings are available, we recommend that this stream be stocked therewith.



Volga R.  
Turkey R.

## ELK CREEK

### Delaware County

This tributary of Turkey River was examined by Dr. Hubbs on August 7, 1932, in Sec. 2 (T. 90 N., R. 4 W.).

The stream here is obviously not trout water. The temperature was high at 4 P.M. ( $26^{\circ}\text{C} = 78.8^{\circ}\text{F}$ ), and local residents say no trout are caught here. We obtained a warm creek fauna and no trout by seining.

The water is moderately clear, but easily roiled. Some algae grow here. The bottom is of stones, clay and mud, and the shores are gravel slopes and clay banks. The stream, 15 to 40 feet wide, is a succession of swift riffles and quiet pools as deep as 7 feet.

Farther upstream, however, we encountered waters which seem fit for trout. Thus Odell Branch just above the junction with Fountain Spring Branch had a temperature of  $18.6^{\circ}\text{C} = 65.5^{\circ}\text{F}$ , while the spring branch read  $20.2^{\circ}\text{C} = 68.4^{\circ}\text{F}$ , at 4:30 P.M. (See also Fountain Spring Branch, below).

When small-mouth bass fingerlings are available, we recommend that this stream be stocked therewith.

These temperatures indicate that conditions for trout are rather uncertain above the point where the spring feeder enters, but that they are quite satisfactory for some distance below.

There are some splendid pools along this creek, up to 30 feet broad and 4 feet or more deep, formed about fallen masses of limestone. A few fine pools in the park have resulted from the heavy flood scouring out holes in the stony bottom, piling up the stones in crosswise bars, which act as dams. The bottom is mostly stony and gravelly, with some sand, silt and bedrock. The water is moderately clear and distinctly green-blue. There is a considerable growth of filamentous algae. The width in the current is generally 10 to 15 feet.



WEST FORK OF BEAR CREEK

Clayton County

Examined by Dr. Hubbs, August 7, 1932, in and just below Bixby State Park  
(Sec. 23, T. 91 N., R. 5 W.).

This is essentially a spring-fed creek, but the temperatures vary widely as indicated by readings obtained about noon, August 7:

Air (a hot, sunny day) 26° C = 78.8° F

Main channel, road bridge 23° C = 73.4° F

Spring-fed side-pool at bridge 19.2° C = 66.6° F

Ford, below bridge 24.2° C = 75.6° F

Pool in creek, between ford and spring 21.4° C = 70.5° F

Spring ("Twin Spring") 8.6° C = 47.5° F

Mouth of spring feeder 11.6° C = 52.9° F

Creek just above same 25.4° C = 77.7° F

Creek for  $\frac{1}{4}$  mile below junction, minimum 16.2° C = 61.2° F

Creek for  $\frac{1}{4}$  mile below junction, maximum 17.2° C = 63.0° F

These temperatures indicate that conditions for trout are rather uncertain above the point where the spring feeder enters, but that they are quite satisfactory for some distance below.

There are some splendid pools along this creek, up to 30 feet broad and 4 feet or more deep, formed about fallen masses of limestone. A few fine pools in the park have resulted from the heavy flood scouring out holes in the stony bottom, piling up the stones in crosswise bars, which act as dams. The bottom is mostly stony and gravelly, with some sand, silt and bedrock. The water is moderately clear and distinctly green-blue. There is a considerable growth of filamentous algae. The width in the current is generally 10 to 15 feet.



An obviously well-informed local resident said that trout were formerly planted, and were abundant near the bridge [presumably in the spring-fed side-pool], and in pools just below the park [that is, below entrance of spring feeder]. The trout were lost following an exceptional flood a few years ago, since when the stream has not been restocked.

Thus both natural and historical evidence indicate that this stream can support trout. The occasional floods may take out trout, but on account of the park with resultant crowds, the fish would be caught off pretty fast.

We suggest that the stream be restocked weekly or biweekly through the season from the nearby Strawberry Point hatchery, with trout of legal size. Enough should be brought in to supply fair fishing.

A dam about 4 feet high and 10 feet wide would back up the spring feeder to form a very fine trout pool about 75 feet long by 12 feet wide. A series of about 10 stone dams about one foot high, above the main dam, would form as many small trout pools. These pools in the feeder could be used either to rear a few hundred fingerlings to plant later in the creek, or could be used to hold some additional legal-size trout for catching.

The spring feeding this creek, formerly the "Twin Springs," has now been concreted, and yields 4 streams of water half filling four 4-inch pipes.

The main creek contains long-nose and black-nose dace and Gilbert shiners in abundance, along with several other species. No trout were taken.



Volga R.  
Turkey R.

SPRING CREEK

Near Strawberry Point

Clayton County

Information obtained at Elkader by Hubbs, August 8, 1932.

This stream, a tributary of Cox Creek and Volga River, is located just north of Strawberry Point. Residents of Elkader (Mr. Gmelin included), catch trout in this brook.

Depth.--8" to 12".

Flow.--Good.

Bottom.--"sandy rock beds."

Shade.--Fair.

Game Fish.--Said to be a trout stream, and to be planted with trout.

Recommendations

See also Mr. Moe's report.



Volga R.  
Turkey R.  
Turkey R.

MINK CREEK

Fayette County

Examined by Salyer on July 9, 1932, at one bridge.

Tributary to.--Volga River, from north in Wadena region.

Temperature.--On July 9, at 11 A.M.: 73.5° F (air 81° F).

Length.--About 6 miles.

Width.--5' to 10' (average 7').

Depth.--6" to 12".

Pools.--Good.

Bottom.--"sandy rock beds."

Shade.--Fair.

Game Fish.--Said to be a trout stream, and to be planted with trout.

Recommendations

See also Mr. Moe's report.



Volga R.  
Turkey R.

BRUSH CREEK

Fayette County

Examined by Salyer, south of Wadena at Sta. 26, July 9, 1932.

Water.--Deep green.

Temperature.--79° F on July 9 (air 85° F).

Current.--Succession of riffles and widened, sluggish pools.

Depth.--Averages 1 foot.

Pools.--To 5 or 6 feet deep.

Natural Food.--Plentiful.

Recommendations

Stocking.--This stream is too warm for trout. We recommend moderate stocking with small-mouth bass fingerlings, primarily to supply the river below.

Improvement.--Desirable.



Volga R.  
Turkey R.

BEAR CREEK

Fayette County

Information given to Salyer on July 8, 1932, by local sportsmen.

Tributary to.--Volga River (from south, below Wadena).

Water Supply.--Mostly spring water except in floods.

Temperature.--"Exceptionally cold."

Water.--"Exceptionally clear."

Pools.--Good holes.

Game Fish.--This is regarded as a trout stream, though "high water throws out trout."

Recommendations

Stocking.--Yearling trout only to be planted.

Improvement.--Desirable.



Volga R.  
Turkey R.

TRIBUTARY OF VOLGA RIVER

Between Fayette and Wadena

Fayette County

Information furnished to Hubbs at Elkader by Mr. Gmelin, August 8, 1932.

This stream, entering the Volga midway between Fayette and Wadena contains trout, some of which have been recently caught.

Surrounding Country.--A short distance below junction of branches the creek flows out across a barren meadow.

Temperature.

Location	Time	Air	Water
Spring at head of E. Br.	Aug. 3		about 50° F
Spring at bridge, E. Br.	Aug. 3		55° F
Creek at bridge, E. Br.	Aug. 3	8:30	55° F
Both branches at junction	Aug. 3		72° F

Length.--About 3 miles; branches have about 1 mile of trout water each.

Vegetation.--Moderate supply of water grass at head; grass also in spring feeder coming in near bridge of East Branch.

Predators.--Water snakes (one seen eating a trout).

Trout Conditions.--The extreme headwaters are fair for young trout, but the flow is too small here for adult trout. Farther down where the stream crosses the road it is somewhat larger, due to the entrance of more springs. The branches are about the same throughout. Trout water ends a short distance below the junction of the branches.



Volga R.  
Turkey R.

Recommendations  
**FROG HOLLOW CREEK**

Fayette County

In Union and Westfield townships. (It is really the East Branch which is known as "Frog Hollow").

Examined by Tarzwell and Koch, August 3, 1932.

Tributary to.--Volga River.

Water Supply.--East Branch and presumably West Branch begin on springs. Other springs enter along the course.

Surrounding Country.--A short distance below junction of branches the creek flows out across a barren meadow.

Temperature.

Location	Time	Air	Water
Spring at head of E. Br.	Aug. 3		about 50° F
Spring at bridge, E. Br.	Aug. 3		53° F
Creek at bridge, E. Br.	Aug. 3 5:30	83° F	69° F
Both branches at junction	Aug. 3		73° F

Length.--About 5 miles; branches have about 1 mile of trout water each.

Vegetation.--Moderate supply of water cress at head; cress also in spring feeder coming in near bridge of East Branch.

Predators.--Water snakes (one seen eating a trout).

Trout Conditions.--The extreme headwaters are fair for young trout, but the flow is too small here for adult trout. Farther down where the stream crosses the road it is somewhat larger, due to the entrance of more springs. The branches are about the same throughout. Trout water ends a short distance below the junction of the branches.



Recommendations

Stocking.--Brook trout; about 500 fingerlings in spring feeder by bridge on East Branch, and 250 yearlings in the two branches. After extensive improvements numbers should be increased. May 9, 1938.

Improvement.--We recommend planting shade, installing deflectors and covers along the creek, and putting brush across the spring feeders as protection for the young fish. Other streams are much better improvement prospects, and might well be improved first.

Width.--3 feet (spring head 4 feet wide).

Pools.--Fair.

Vegetation.--Cress abundant.

Fishes.--Few seen in stream.

Recommendations

This little stream should be more thoroughly examined to determine whether or not it is suitable for trout. Very likely trout would not do well here.



## WEST FORK

Franklin, Butler and Brewer counties.

Examined briefly by Salzer on July 13, 1932, at Sta. 61, just out of Dumont, and at Sta. 62, east of Dumont.

Flooding.—Bad; stream-bank-full when examined, and drift wood piles over low ground showed a recent overflow.

Shores.—Mud banks.

Surrounding Country.—Open woods.

Width.—50 ft. (sta. 61); 40 ft. (Sta. 62).

Depth.—14 inches to 3 feet

Bottom.—Muddy sand (Sta. 61).

Cover.—Some snags; also undercut banks.

Fishing.—Small-mouth bass fishing is reported throughout the stream down from its head at the junction of Beaverdam and Bailey Creeks. Our examination was too superficial to give any real idea of the stream's worth.

Width.—30 to 40 feet (Sta. 61).

Depth.—To 3 1/2 feet, with deeper holes (Sta. 61).

Bottom.—For the most part of limestone (Sta. 61). Muddy with scattered boulders.

Shade.—None or little.

Natural Food.—Good

Game Fish.—This is naturally a fine small-mouth bass stream. Mr. Salzer's report of finding many beautiful specimens is distressing from the pollution. Apparently he wrote of wholesale destruction of game, muskrats, black bear and bobcats. He heard reports (July, 1932), that the bass were then recovering from the last extermination.



Shellrock R.  
Cedar R.

### LIME CREEK

### CERRO GORDO COUNTY

(Also known as West Fork of Shellrock River and as Winnebago Creek; the last name is said to be the early Indian name, which a pow-wow at Forest City in 1926 is said to have attempted to resurrect.)

Examined by Salyer on July 14, 1932, at Mason City pollution sources, and on July 15 at Red Mill 6 or 7 miles above Mason City; other information from Hart's report.

Tributary to.—Shellrock River.

Pollution.—The discussion of pollution in this creek by Mr. Hart is quite in agreement with our experience with sugar and packing plant wastes under similar conditions in Michigan (see his report, also his quotation under Shellrock River in our report). We saw a dead sucker off the Decker Plant sludge effluent. The streams appeared to be unpolluted at Red Mill above Mason City.

Temperature.—A warm stream: 82°F on July 15, 10:30 A.M., with air at 92°F.

Shores.—"The banks are high and well protected. The stream flows through rough country and the erosion factor is not great". (Hart). Below Mason City the stream flows between moderately high limestone bluffs, in a very attractive setting.

Width.—30 to 50 feet (Red Mill).

Depth.—To 3 1/2 feet, with deeper holes (Red Mill).

Bottom.—"For the most part of limestone" (Hart). Rocky with scattered boulders

Shade.—None or little.

Natural Food.—Food

Game Fish.—This is naturally a fine small-mouth bass stream. Mr. Hart wrote of finding many beautiful specimens in distress from the pollution. Elsewhere he wrote of wholesale destruction of carp, suckers, black bass and bullheads. We heard reports (July, 1932), that the bass were then recovering from the last extermination



(we saw a beautiful small-mouth bass in mouth of Calamus Creek); normally there is said to be good small-mouth bass fishing in this stream.

We seined more small-mouth bass in this creek, at Red Mill, than anywhere else in Iowa. Pickerel are also caught here.

Rough Fish.--Many carp were seen, which were caught at Mason City; also a dead sucker.

#### Recommendations

Stocking.--We concur in Mr. Hart's recommendation that no stocking be done below Red Mill Dam until the excessive pollution nuisance is removed, with the exception that the stretch from Red Mill to Mason City can be safely stocked (as well as the region above Red Mill), with small-mouth bass fingerlings.

Pollution.--It should be the rigid policy of the Fish and Game Department to seek the alleviation of pollution in this potentially very fine stream which was originally a beautiful small-mouth bass river.

Under "The Iowa River" (of which the Shellrock is not a tributary), Mr. Hart went into some detail as to pollution. His remarks were: "Since Lake Albert Lea [Minnesota] is in reality the source of this river, and the fact that domestic and industrial pollution are so various at this point, the effects can be seen over the entire river. Added to this, pollution coming from the American Beet Sugar Plant at Mason City by way of Lime Creek, it is not advisable to use either of these rivers for fish propagation. On June 28, 1931, thousands of fish were killed in the Shellrock River due to pollution coming from Albert Lea. (Hart listed the D.O. as 0.0 for 3 stations in the river, on June 30, namely at Dam Lake in Albert Lea, Northwood and Emmett). Each fall, thousands of fish are killed at Mason City, as soon as the sugar plant begins to empty its wastes into Lime Creek. I have visited both of these rivers at various points during times of maximum fish loss, and have found that the fish that died, died of suffocation rather than any one disease that could be prevalent. In each instance, there was wholesale destruction of fish



## SHELLROCK RIVER

Worth, Cerro Gordo, Floyd, Butler, Brewer and Blackhawk counties.

Pollution information from Hart's report. Examined by Salyer on July 13 at Sta. 67 (Greene, Butler County); on July 14 at Sta. 71 (one mile south of Plymouth, Cerro Gordo County), and at Sta. 75 (1) mile east of Kensett (Worth County).

Tributary to.—Cedar River.

Pollution.—Mr. Harry E. Hart gave as his opinion, in one part of his report, that the entire Cedar River system above Waterloo is satisfactory from the standpoint of pollution except for Lime Creek from the sugar plant to the point where it enters Shellrock River. He added that "there are times when the Shellrock River receives the effects of the pollution coming from the American Beet Sugar Plant at Mason City".

On another page, the Shellrock is obviously excepted from such a statement, for Hart wrote: "The Shell Rock River is not at all satisfactory and should come far down the list of stockable [streams]".

Under "The Iowa River" (of which the Shellrock is not a tributary), Mr. Hart went into some detail as to pollution. His remarks were:—"Since Lake Albert Lea [Minnesota] is in reality the source of this river, and the fact that domestic and industrial pollution are so serious at this point, the effects can be seen over the entire river. Added to this, pollution coming from the American Beet Sugar Plant at Mason City by way of Lime Creek, it is not advisable to use either of these rivers for fish propagation. On June 28, 1931, thousands of fish were killed in the Shellrock River due to pollution coming from Albert Lea. [Hart listed the D.O. as 0.0 for 3 stations in the river, on June 30, namely at Dam Lake in Albert Lea, Northwood and Kensett]. Each fall, thousands of fish are killed at Mason City, as soon as the Sugar Plant begins to empty its wastes into Lime Creek. I have visited both of these rivers at various points during times of maximum fish loss, and have found that the fish that died, died of suffocation rather than any one disease that could be prevalent. In each instance, there was wholesale destruction of fish



life with every class of fish being involved, Carp, Suckers, Black Bass, and even Bullheads suffered the same fate. Evidences of suffocation were general in the vicinity. The fish were hovering near the surface gasping for oxygen. Internally there was little evidence of parasitism or disease".

We obtained evidence that the stream was just recovering in 1932 from losses due to the sugar factory pollution.

At Greene we noted the destruction of the streams natural beauty by the quantity of cans and other trash on its banks.

The sewage treatment at Charles City is thought to be adequate.

Dam.—The dam at Greene is about 10' x 225'; when examined about 12 dead fish were found, stranded on apron by previous high water; no fishway in this dam (we understand this is true for whole course of Shellrock River.

Shore.—Open pasture (near Kensett).

Temperature.—A warm stream: 77°F with air at 86°F on July 13 at Greene; 88.3°F with air at 91.5°F at 2:00 P.M. on July 14 below Plymouth.

Water.—Only moderately turbid after heavy rains; clears sufficiently for fly fishing.

Average Width.—150 yards at Greene; 60 to 70 feet across Plymouth; 70 feet near Kinsett.

Depth.—2 feet, with a few deeper holes, and reduced to 6 inches in riffles (below Plymouth); up to 3 feet at Kinsett.

Bottom.—Rock (at Greene); rubble with no mud (below Plymouth); rubble (near Kensett).

Cover.—No shelter (Sta. 71 and 75).

Shade.—None (Near Plymouth) and Kensett).

Vegetation.—Coontail in magnificent stands, several species of Potamogetons, Valisneria, etc.

Natural Food.—Insect life: abundant; many snails, crayfish and forage fish.



Fishing.--Said to be better than elsewhere above dam at Greene and below dam at Marblerock.

The local warden claimed that fishing in the Shellrock was better in 1932 than for several years, and laid this to an alleviation of the pollution nuisance.

Game Fish.--Hart listed black bass and bullheads as being killed in large numbers by pollution in bass. Reports for this section indicate channel catfish, pickerel, walleyes, a few bullheads and many small-mouth bass. Bass were seen rising in the river near Kensett.

Rough Fish.--Hart listed carp and suckers as being killed in wholesale lots by pollution in this river. At Greene we found carp and quillbacks.

#### Recommendations

Pollution.--It is very important that the pollution of this potentially fine stream be ended.

Stocking.--Channel cats, bullheads, crappies and bluegills above dams; small-mouth bass fingerlings.

Width.--75 to 100 feet at Chickasaw; 20 to 25 feet below Brownsville dam.

Depth.--8 to 12 feet at Chickasaw (dammed) up to 3 feet below Brownsville.

Bottom.--Some gravel and sand in original stream bed below old dam at Brownsville, but very muddy above.

Shade.--Fair (Brownsville).

Game Fish.--A few walleyes and excellent small-mouth fishing at Chickasaw. Large-mouth bass caught at Brownsville.

Rough Fish.--Quillbacks and hog suckers caught at Brownsville.

Prage Fish.--Minnows and shiners caught at Brownsville.

#### Recommendations

Stocking.--Small-mouth bass should be generally planted along this stream. Walleyes and probably walleyes should be planted (in response to local requests) in the backwater at Chickasaw.



LITTLE CEDAR RIVER

Mitchell, Floyd and Chickasaw counties.

Examined by Salyer at Brownsville, Mitchell County, on July 13, 1932.

Tributary to:-Cedar River.

Water Supply.-Mostly surface drainage; heads in a slough across Minnesota line.

Pollution.-Hart reported this to be most satisfactory, from the pollution viewpoint, of three major tributaries of the Cedar.

Temperature.-A warm stream: 84.5 F with air at 88°F at 4:30 P.M., July 13, at Brownsville.

Dam.-The examination was made primarily to inspect site of old dam which had gone out. Mr. Crane's inquiry brought a request for new dam. The original dam was 60 feet long and 5 feet high, laid up of loose boulders.

Shore.-"High stone bluffs along river at Chickasaw and for 5 miles above." Above old dam at Brownsville, muddy (old pond basin) with rank growth of Polygonum.

Current.-Rather swift at Brownsville.

Width.-"75 to 100 feet at Chickasaw"; 20 to 25 feet below Brownsville dam.

Depth.-"8 to 12 feet at Chickasaw" (Dammed) up to 3 feet below Brownsville.

Bottom.-Some gravel and sand in original stream bed below old dam at Brownsville, but very muddy above.

Shade.-Fair (Brownsville).

Game Fish.-"A few wall-eyes and excellent small-mouth fishing at Chickasaw".

Large-mouth bass, seined at Brownsville.

Rough Fish.-Quillbacks and hog suckers seined at Brownsville.

Forage Fish.-Minnows and shiners seined at Brownsville.

Recommendations

Stocking.-Small-mouth bass should be generally planted along this stream. This species and probably walleyes should be planted (in response to local requests) in the backwater at Chickasaw.



Dam.—There does not seem to be enough fishing demand in the Brownsville region to warrant the reconstruction of the dam there for that purpose. However, a dam there would be advantageous from a fishing standpoint. A dam would, however, serve better farther down the Little Cedar, where fishing is better.

Water Supply.—Creek arises as a large spring flowing about 2 or 3 million gallons a day.

Temperature.—Head spring 48° F; 1 mile downstream 75° F; 2 miles downstream 82° F (temperatures taken about 3:30 P.M., July 14, when air was at 94° F).

Current.—At 2 miles below source and throughout most of the course, creek runs in series of sluggish pools.

Width.—10 to 15 feet.

Depth.—2 to 4 feet.

Shade.—Largely unshaded.

Vegetation.—At 2 miles below source and throughout most of course woody.

Natural Food.—Lots of ridges.

Fish.—Occasionally caught in this stream where examined. Some were planted

six years ago.

#### Recommendations

Stocking.—No advice against stocking this stream. It warms up too fast.

Damming.—The supply of water is sufficient to produce a large trout pond, and we recommend that the creek be dammed for this purpose, by state, club or individual. The resulting pond should furnish excellent trout fishing.



## TURTLE CREEK

Mitchell County

Examined by Salyer on July 14, 1932, 4 miles out of St. Ansgar.

Tributary to.—Cedar River.

Water Supply.—Creek arises as a large spring flowing about 2 or 3 million gallons a day.

Temperature.—Head spring  $48^{\circ}\text{F}$ ; 1 mile downstream  $78.5^{\circ}\text{F}$ ; 2 miles downstream  $82^{\circ}\text{F}$  (temperatures taken about 3:30 P.M., July 14, when air was at  $94^{\circ}\text{F}$ ).

Current.—At 2 miles below source and throughout most of the course, creek runs in series of sluggish pools.

Width.—10 to 15 feet.

Depth.—2 to 4 feet.

Shade.—Largely unshaded.

Vegetation.—At 2 miles below source and through most of course weedy.

Natural Food.—Lots of midges.

Trout.—Occasionally caught in this stream where examined. Some were planted "six years ago".

#### Recommendations

Stocking.—We advise against stocking this stream. It warms up too fast.

Damming.—The supply of water is sufficient to produce a large trout pond, and we recommend that the creek be dammed for this purpose, by state, club or individual. The resulting pond should furnish excellent trout fishing.



## CEDAR RIVER

Mitchell, Floyd, Chickasaw, Bremer, Blackhawk, Benton, Linn, Johnston, Cedar, Muscatine and Louisa counties

Visited by Salyer at Cedar Rapids on July 10; at road into Laporte on July 11; at Floyd and north of Floyd and on Iowa 9 west of O Sage on July 13, at Mitchell and at Otranto, Mitchell County, on July 14; pollution information from Hart's Report.

Water Supply.—Largely surface water but also some springs (3 large ones in river bed, 3 miles below Otranto, on forcing water surface up 6 or 8 inches; its temperature 47°F, unusually cold for an Iowa spring.

Pollution.—Harry E. Hart concluded that the whole Cedar River system above Waterloo is satisfactory for fish life, with the exception of Lime Creek, Cerro Gordo County, but that the whole river below Waterloo is in such a condition as not to justify any efforts to increase the fish life. He presents a considerable body of data, borrowed from the State Health Department to substantiate this view, and to indicate where the pollution is most severe. These badly polluted areas, as reported, are: (1) just below Waverly, where a serious pollution by canning waste occurs about three weeks of each year; (2) just below Cedar Falls (sanitary sewage) and (3), most serious, just below Cedar Rapids. Hart described conditions below Cedar Rapids as continuously bad, though leading to a concentration of carp. Later in his report, Mr. Hart wrote of thousands of pounds of carp suckers (Catostomus commersoni) taken from the Cedar River above Waterloo and Cedar Rapids, in the heavy pollution. But we believe Mr. Hart was confounding carp (Cyprinus carpio) and carp suckers (Catostomus commersoni species).

We do not believe that the data prove Hart's pessimistic view, but neither do we feel confident that his view was wrong. There is indicated a very considerable recovery of the stream between Waterloo and Cedar Rapids and again toward the mouth. We consider it very probable that these sections could be planted with fish, at least



with catfish.

Hart seems to have underestimated the rather serious pollution reaching the state from packing plants, creameries, etc., at Austin and other Minnesota towns on the upper river. This helps to destroy what would otherwise be a river stretch (down to the mouth of the Shellrock) of unique and pristine beauty.

We heard of pollution by creamery wastes at Osage.

Dam.—The power dam at Mitchell, 175 feet long x 20 feet high, impounds a lake 5 miles long. Dam at Otranto (concrete and poles) is 110 feet long by 6 feet high.

Shore.—West of Osage, gently sloping and well grassed banks.

Surrounding Country.—In same region, open prairie and pasture country.

Temperature.—A warm stream: 78°F with air at only 84°F above dam at Cedar Rapids, July 10, 5:00 P.M.; 79°F with air at only 78.5°F at 7:30 P.M., July 11, on road into Laporte; 81°F with air at same point, at 3:30 P.M. on July 13, at Floyd; 87°F with air at 90°F at 7:00 P.M. on July 13, west of Osage; 82.5°F with air at 92°F at 2:30 P.M. on July 14, at Mitchell; 85.5°F with air at 95°F at 6:00 P.M. on July 14, at Otranto (near state line); reduced to 69°F near big springs below Otranto dam.

Water.—Turbid when examined but upper section clears; greenish at Floyd, and clear above town.

Width.—Very wide at road into Laporte, wide north of Floyd; averaging 40 feet west of Osage; 125 feet at Otranto.

Depth.—12 to 15 inches west of Osage; 1 to 3 feet at Otranto.

Bottom.—Very muddy at road into Laporte; lovely gravel at and above Floyd; flat rubble west of Osage without hint of silt, and with low limestone ledges at intervals; rocky at Mitchell; at Otranto with more sand and gravel than Shellrock and with large boulders strewn all over bottom.

Shade.—None for miles in region of Osage; at Otranto, better shaded than the Shellrock.

and again above Vinton.



Vegetation.--In upper reaches good: lots of Valisneria, coontail and pond weeds (several species of Potamogeton) and some Elodea.

Natural Food.--West of Osage we found the best food we had seen for days.

Spawning Grounds.--Mark told us he observed spawning small-mouth bass and sunfish on the gravel bottom of Cedar River north of Floyd in June, 1933.

Fishing.--Said to be good in the bayous around Cedar Falls and Waterloo.

Game Fish.--Good crappie fishing is reported in pond above Charles City Dam; good small-mouth bass fishing reported for river below Waterloo Dam. Many small-mouth bass about 10 inches long caught at Floyd. Other fish caught near Floyd are said to be: walleyes in spring and fall, large-mouth bass, pickerel and very small rock bass. The river fishing is said to be good down to Nashua. About Mitchell small-mouth bass, rock bass, etc., are taken. It is reported that there are no catfish above Osage City. Rock bass, green sunfish, bluegills and long-eared sunfish seined below dam at Otranto.

Rough Fish.--The lower course of this river is said to be saturated with carp (see also critique of Hart's statements above, under "Pollution").

Obnoxious Fish.-- It is reported that there are no gar in the Cedar above the Cedar Rapids Dam.

Forage Fish.--Shiners, chubs, minnows, darters and tadpole cats seined below Otranto dam.

Illegal Fishing.--At Cedar Rapids, river fishermen were seen fishing with about a dozen trot lines.

#### Recommendations

Pollution.--This lovely river should be restored to its natural beauty. This calls for cooperation between Iowa and Minnesota officials.

Stocking.--The upper reaches of the Cedar certainly deserve good stocking. West of Osage the river was reminiscent of Ozark streams. Small-mouth bass fingerlings should be stocked heavily from the state line down to Nashua, then again above Waverly, and again above Vinton.



TIPTON CREEK

Hardin County

Hardin County

Tributary to South Fork and Iowa River.

Fishing.--Testimony given us indicated that the lower half of this creek contains small-mouth bass.

Current.--Swift

Recommendations

Stocking.--Small-mouth bass fingerlings.

Width.--30 to 35 feet.

Depth.--Deep.

Fishing.--Some small-mouth bass are caught here; also channel catfish.

Recommendations

Stocking.--Small-mouth bass fingerlings and channel catfish. The bridge at Iowa is a convenient point for stocking.



SOUTH FORK

Hardin County

Examined by Salyer July 12, 1932, in Iowa 58, west of Eldora.

Tributary to.--Iowa River.

Flooding.--Considerable (receding when examined).

Current.--Swift

Length.--8 or 10 miles of fishing water, from north

Width.--30 to 35 feet.

Depth.--Deep.

Fishing.--Some small-mouth bass are caught here; also channel cats.

Recommendations

Stocking.--Small-mouth bass fingerlings and channel catfish. The bridge on Iowa 58 is one convenient point for stocking.

Water.--This river was found by us to be very dark. It clears up, however, according to Dr. Lundall, the clearing progressing upstream.

Bottom.--In the better fishing sections (see below) the bottom is "very rocky."

Fishing Reputation.--(Information largely obtained from Dr. Lundall of Webster City). The river is generally fished from the dam at Humboldt to Stratford (presumably skipping the worst of the Ft. Dodge pollution). The fishing is reported to be exceptionally good from Lehigh to Stratford. From above Fort Dodge to the Humboldt Dam is another good stretch.

In these better fishing sections small-mouth bass, crappies, sail-fins and catfish are caught. The catfish ("blue," "channel," and "yellow") are more numerous below Fort Dodge.



rough fish.--The lower course of the Des Moines is said to be saturated with carp.

### DES MOINES RIVER

\* Humboldt, Webster, Boone, Dallas, Polk, Warren, Marion, Mahaska, Monroe,  
Wapello, Davis, Van Buren and Lee counties

Pollution.--Mr. H.E. Hart concluded that "The Des Moines River below the city of Fort Dodge is not at all satisfactory for stocking purposes." He presented a mass of data on stream flow and oxygen reserve from Ft. Dodge to the mouth. The untreated wastes of that city create a condition of pollution for 20 miles, where the river apparently recovers as far as oxygen is concerned. In fact, there are reports of small-mouth bass fishing for some distance on either side of the mouth of the Boone River, and at Boone, and doubtful hearsay evidence in between. At Des Moines an excessive load of industrial and domestic sewage goes untreated into the river: a clear disgrace to the state of Iowa. From this, "the river never fully recovers." Ninety-five miles below the city of Des Moines, Othumwa empties raw sewage of both classes into the river. The effects are visible until the water enters the Mississippi River.

Water.--This river was found by us to be very dark. It clears up, however, according to Dr. Lundell, the clearing progressing upstream.

Bottom.--In the better fishing sections (see below) the bottom is "very rocky."

Fishing Reputation.--(Information largely obtained from Dr. Lundell of Webster City). The river is generally fished from the dam at Humboldt to Stratford [presumably skipping the worst of the Ft. Dodge pollution]. The fishing is reported to be exceptionally good from Lehigh to Stratford. From above Fort Dodge to the Humboldt Dam is another good stretch.

In these better fishing sections small-mouth bass, crappies, wall-eyes and catfish are caught. The catfish ("blue," "channel," and "yellow") are more numerous below Fort Dodge.



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Rough Fish.--The lower course of the Des Moines is said to be saturated with carp.

#### Recommendations

Stocking.--We agree that the Des Moines River (or at least most of it) is not suitable for stocking with game fish of the better sorts (bass, pike, etc.). To what degree regions above Des Moines and toward the mouth of the river are worth being stocked with catfish and other less prime game species we cannot say, not having studied this portion of the stream. The point is worth consideration, however. It is even possible that stocking with bass near Boone would appear in order, if an examination were made. The section of the stream supposed to contain bass, near the mouth of the Boone River, should naturally be fed from that tributary. The pond above the Fraser Dam should be stocked with small-mouth bass and many catfish.

The river from Humboldt Dam down to just about Fort Dodge would seem worthy of being stocked with some small-mouth bass and pike.

be extended. Cover should be put in the holding basins.



SKUNK RIVER

Wright, Hamilton, Story, Polk, Jasper, Marion, Mahaska, Keokuk, Washington,  
Jefferson, Henry, Lee and Des Moines counties

Water.--Quite clear above Ames (Dr. Lundell).

Game Fish.--The main Skunk above Ames still carries small-mouth bass (Dr. Lundell).

Forage Fish.--Suckers and chubs above Ames.

Recommendations

Stocking.--This stream above Ames would seem to call for small-mouth bass fingerlings.

Improvement.--The work of the Story City Chapter of the Dilg League in building small dams to form holding basins in this stream (suggestion of Mr. Marnette) should be extended. Cover should be put in the holding basins.



## CLEAR CREEK

Cedar, Linn and Johnson counties

Examined August 17, 1932, by Hubbs.

Examined by Selzer on July 10, 1933, at Marion.

Tributary to.--Cedar River (entering near Luttlif).Location.--Cedar River (from north below Cedar Rapids).

This stream, having a total length of about 6 miles, would apparently serve excellently as the feeder of an artificial lake. It is considered in that light,

and briefly described, in our Report on Examination of Hatchery Sites in Iowa.

Temperature.--74° F at 3:00 P.M., July 10 (air 84° F).

The state land on this creek (in Sec. 21, T. 82 N., R. 4 W.) is not recommended for

Vegetation.--A wonderful stand of arrowweed in mill pond.

development as a rearing station.

Game Fish.--Bass and black bullheads in pond. This is an important kid's fish-

ing pond: we saw about a dozen fishing. From dam to mouth of creek (7 miles) there

was reported to be good fishing for small-mouth bass, a few large-mouth bass, blue-

gills, green sunfish and probably catfish.

Game Fish.--Bass in mill pond, and carp and buffalo eel below the dam.RecommendationsStocking.--Bass large-mouth bass, and bluegills, crappies and bullheads above

dam.



INDIAN CREEK

Linn County

Examined by Salyer on July 10, 1932, at Marion.

Tributary to.---Cedar River (from north below Cedar Rapids).

Dam.---A mill dam 10 ft. high, backing up about 7 to 10 acres of water; no fishway.

Temperature.---76° F at 3:00 P.M., July 10 (air 84° F).

Vegetation.---A wonderful stand of arrowhead in mill pond.

Game Fish.---Bass and black bullheads in pond. This is an important kid's fishing pond: we saw about a dozen fishing. From dam to mouth of creek (7 miles) there was reported to be good fishing for small-mouth bass, a few large-mouth bass, bluegills, green sunfish and probably catfish.

Rough Fish.---Carp in mill pond, and carp and buffalo occur below the dam.

Recommendations

Stocking.---Some large-mouth bass, and bluegills, crappies and bullheads above dam.



HAUBLE CREEK

HAUBLE CREEK

Benton county

Benton and Benton counties

Tributary to.--Cedar River.

Information obtained by Sawyer on July 11, 1932.

Game Fish.--Although this is apparently not a trout stream, we heard (on July 28, 1932) that a trout had recently been caught by a woman, fishing with worms

about 8 miles of fishable water.

from the bridge in Vinton. This fish was presumably a wanderer from a planting of

Smallmouth.--This stream is said to yield small-mouth bass.

750 adult trout, made earlier in the year in Spring Creek, farther up the Cedar.

Recommendation

Stocking.--Small-mouth bass fingerlings.

Improvement.--Probably desirable and practicable.



BEAR CREEK

Buchanan and Benton counties

Information obtained by Salyer on July 11, 1932.

Tributary to.--Cedar River (entering 6 miles north of Vinton).

Length.--"About 8 miles of fishable water."

Game Fish.--This stream is said to yield small-mouth bass.

Recommendation

Stocking.--Small-mouth bass fingerlings.

Improvement.--Probably desirable and practicable.



## SPRING CREEK

## LIME CREEK

Buchanan and Benton counties

Information obtained locally by Salyer on July 11 and 28, 1932.

Tributary to.--Cedar River (entering just south of county line).Length.--"About 8 miles of fishable water."

Game Fishes.--Although this would not seem to be a trout stream, we learned that some trout had recently been caught in this stream by Mr. John W. Tobin, President of the Vinton Fish and Game Club. These fish we assume were wanderers from a planting of 750 adult trout made a short time previously in Spring Creek, 5 miles up the Cedar. Small-mouth bass are reported to be caught in this creek.

Recommendations

Stocking.--Small-mouth bass fingerlings.

Improvement.--Probably desirable and practicable.

Bottom.--Upper reaches very silty; lower portions were sandy and gravelly; at one place a mud bar almost a yard deep.

Shade.--Shady and open-prairie stretches alternate.

Natural Food.--Little found, and almost no place for its lodgment.

Predators.--Water snakes (1 killed).

Fishing History.--This year (1932) the La Porte City Chapter of the Izaak Walton League planted 750 or 1300 legal-size trout (two reports) in Spring Creek. These seem to have spread widely, because trout were afterward caught not only in Spring Creek but also in other creeks emptying into the Cedar as far down as below Vinton, that is, 15 to 18 miles below. Since no other trout were known in this area and since no others were known to have been planted this year, it is to be assumed that all of these stray trout came from the Spring Creek planting. Soon after that planting, Mr. John W. Tobin, President of the Vinton Fish and Game Club, caught some trout



SPRING CREEK

Blackhawk and Buchanan counties

Information obtained by Salyer, July 11 and 28, 1932; examined at several points along 5 mile stretch near road between Gilbertville and Brandon on July 11.

Tributary to.--Cedar River.

Water Supply.--Surface and spring water mixed; springs are said to come in every half-mile or so along 14 mile course.

Pollution.--Creamery pollution at Jessups reported.

Shore.--High, grassy banks, with a recent silt deposit more than a foot deep!

Temperature.--A fairly warm stream where examined: 75° F with air only 80° F,

6:00 P.M., July 11.

Length.--About 14 miles.

Width.--In the 5 mile stretch increases from 20 ft. to 40 ft.

Pools.--Few pools not now filled with sand.

Bottom.--Upper reaches very silty; lower portions more sandy and gravelly; at one place a mud bar almost a yard deep.

Shade.--Shady and open-prairie stretches alternate.

Natural Food.--Little found, and almost no place for its lodgement.

Predators.--Water snakes (1 killed).

Fishing History.--This year (1932) the La Porte City Chapter of the Izaak Walton League planted 750 or 1300 legal-size trout (two reports) in Spring Creek. These seem to have spread widely, because trout were afterward caught not only in Spring Creek but also in other creeks emptying into the Cedar as far down as below Vinton, that is, 15 to 18 miles below. Since no other trout were known in this area and since no others were known to have been planted this year, it is to be assumed that all of these stray trout came from the Spring Creek planting. Soon after that planting, Mr. John W. Tobin, President of the Vinton Fish and Game Club, caught some trout



in Lime Creek, which empties into the Cedar River 15 miles below the mouth of Spring Creek. Since then, a number have been caught in the creeks still farther down the Cedar. Fishing from the Hauble Creek bridge in the heart of Vinton, for instance, a woman caught a trout on a gob of worms. This incident shows the tendency of trout to wander when planted in quasi-trout streams. The trout were probably driven out of Spring Creek by the flood which left a deep silt deposit on the banks.

Coarse Fish.--Hog suckers.

Forage Fish.--Chubs, shiners and darters seined.



ROCK CREEK

Grundy, Tama, Benton and Blackhawk counties  
Tama, Benton and Blackhawk counties

Examined by Salyer, evening of July 11, 1932, at Laporte (near mouth).  
Information from Warden Jags to Salyer, July 12, 1932.

Tributary to.--Cedar River (entering just above Spring Creek).

Water Supply.--Largely surface water; floods badly ("up" when seen).  
Length.--About 15 miles.

Water.--"Clears up after rain gets away" (Warden Jags).  
Fishign.--"Gives sucker fishing."

Dam.--An ice dam built here by Mr. D.W. Quakenbush of Laporte is almost like a  
Recommendations

"Hewitt Dam," though the idea was original with him. It held for years.  
Stocking.--None recommended.

Bottom.--"Sand and silt" (Warden Jags).

Fishing.--This stream is reported to be little fished. In Grundy County  
"just a bullhead stream" (Warden Jags).

Recommendations

Stocking.--Evidence points against either trout or bass for this stream.

Bullheads perhaps.



BLACKHAWK CREEK

INDIAN CREEK

Blackhawk County.

Information given Salyer by Warden Jago, July 12, 1932. Examined and

Examined by Salyer July 11, 1932, east of Gilbertville.

Tributary to.--Cedar River. (entering just above Waterloo).

Width.--4 to 8 feet. (after rain gets away).

Depth.--Shallow. (southwest of Waterloo).

Bottom.--Sandy. (at this point and probably throughout course).

Shade.--Well shaded. (very shady southwest of Waterloo).

Forage Fish.--Minnow seines here had river chubs and several species of shiners.

Game Fish.--None reported.

Recommendations

Stocking.--None recommended.



## BEAVER CREEK

Franklin, Butler and Blackhawk counties.

## BLACKHAWK CREEK

Examined by Salyer on July 12, 1932, at Sta. 49, east of New Hartford; Sta. 50, near Parkersburg, and Sta. 51, at Austin, all in Butler County.

Grundy and Blackhawk counties.

Information given Salyer by Warden Jago, July 12, 1932. Examined and seined briefly 4 miles SW of Waterloo, on July 11.

Tributary to.—Cedar R. (entering just above Waterloo).

Water.—"Clearing up after rain gets away".

Width.—70 feet, southwest of Waterloo.

Depth.—Shallow at this point and probably throughout course.

Bottom.—"Sand and silt", very muddy southwest of Waterloo.

Fishing.—"Just a bullhead stream in Grundy County".

always a muddy stream,

Average Width.—20 ft. at Sta. 51; 30 ft. at Sta. 50; 50 to 60 ft. at Sta. 49.

Depth.—5 inches to 1 ft. at Sta. 51; shallow at Sta. 49.

Bottom.—Mucky with some sand at Sta. 51, with some rock on riffles; deep silt, too muddy to seine, at Sta. 49.

Shade.—Average (Sta. 51).

Natural Food.—Little at Sta. 51.

Recommendations

Stocking.—This stream would not seem fit for stocking, unless with bullheads or other fishes of poorer grade.



## BEAVER CREEK

Franklin, Butler and Blackhawk counties.

Examined by Salyer on July 12, 1932, at Stas. 49, out of New Hartford; Sta. 50, near Parkersburg, and Sta. 51, at Austin, all in Butler County.

Tributary to.—Cedar River, entering from west a few miles above Cedar Falls.

Flooding.—Bad throughout course. Stream had recently overflowed badly when examined (Sta. 49).

Dam.—A small stone dam near Parkersburg.

Temperature.—This was shown to be a warm creek by two readings:

<u>Where</u>	<u>Date</u>	<u>Time</u>	<u>Air</u>	<u>Water</u>	<u>Remarks</u>
Sta. 51	July 12	4:00P.M.	93° F	83° F	{ Stream had just been "up"
Sta. 49	"	2:50P.M.	93° F	86° F	

Water.—Very roily when examined (stream had been "up" recently); presumably always a muddy stream.

Average Width.—20 ft. at Sta. 51; 50 ft. at Sta. 50; 50 to 80 ft. at Sta. 49.

Depth.—6 inches to 4 ft. at Sta. 51; shallow at Sta. 49.

Bottom.—Mucky with some sand at Sta. 51, with some rock on riffles; deep silt,—too muddy to seine,—at Sta. 49.

Shade.—Average (Sta. 51).

Natural Food.—Little at Sta. 51.

Recommendations

Stocking.—This stream would not seem fit for stocking, unless with bullheads or other fishes of poorer grade.



MAYNES CREEK

Franklin and Butler counties.

Examination by Salyer on July 13, 1932, on U.S. 20 northeast of Iowa Falls  
(Sta. 59).

Tributary to.-- West Fork; Shellrock River; Cedar River.

Shore.--Mud banks and bars.

Temperature.--A warm creek: 75°F at 9:30 A.M., July 13, with air at only 84°F.

Water.--Very roily when examined (following rain), but clearing.

Average Width.--15 ft.

Depth.--8 in. to 3 ft.

Bottom.--Silty sand and gravel.

Natural Food.--Crayfish and forage fish numerous; insect food poor.

Fishing.--Small-mouth bass and pickerel fishing is reported for this stream,  
below the forks.

Rough Fish.--Suckers seined.

Forage Fish.--Shiners, chubs, minnows and darters seined.

Recommendations

Stocking.--Small-mouth bass fingerlings.



SHADDOCK RIVER

Pollution.--We quote from Harry E. Hart's report: "The Shaddock River system receives perhaps as much pollution for the size of the system, as any in the state. Last year, on numerous occasions, fish were killed in large numbers and the only apparent reason for death was the chemical pollution in the water brought about by pollution."

OTTER CREEK

Franklin and Butler counties.

Examined by Salyer on July 13, 1932, north of Hampton, Franklin County.

Tributary to.--West Fork, then Shellrock River, then Cedar River.

Flooding.--Bad.

Shores.--Mud Banks.

Temperature.--A rather warm stream: 73°F at 10:30 A.M., July 13, with air at only 88°F.

Average Width.--30 feet.

Depth.--10 in. to 3 feet.

Bottom.--Mud.

Shade.--Scattered.

Fishing.--Small-mouth bass fishing is reported from west of Chapin to mouth. However, this looked like a bullhead stream to us.

Recommendations

Enforcement.--There is a local desire that this stream be given more warden service.

Stocking.--We heard local call for the stocking of this stream. Further examination is called for to determine on the advisability of stocking with small-mouth bass.



## RACCOON RIVER

Pollution.--We quote from Harry E. Hart's report: "The Raccoon River System receives perhaps as much pollution for the size of the system, as any in the state. Last year, on numerous occasions, fish were killed in large numbers and the only apparent reason for death was the chemical conditions, in the water brought about by pollution."

Reg.--This year (1932) this stream was reported closed indefinitely for small-mouth bass propagation.

Spawning Stream.--This is a spawning stream for small-mouth bass.

Recommendations

Designation.--The designation of this stream as a nursery stream is possibly desirable in the present lack of small-mouth bass propagation on any scale in the state. The difficulty of enforcing the closed regulation in such a large stream is great and will lead to want, to repeated violation. But as soon as bass are available for stocking, this stream, if not sooner, it ought to be opened for fishing.

Fishing.--This stream would need to sell for stocking with small-mouth bass fingerlings.

Improvement.--It is all probability the "improvement" will prove practicable and desirable, using such methods as have been developed chiefly for trout streams. The primary need is for small stone dams to create "holding basins," which should have some cover.



WHITE FOX CREEK

Wright County

Information given Salyer by Dr. Lundell of Webster City, on July 31, 1932.

Tributary to.--Boone River (near Webster City).

Water Supply.--"Spring-fed."

Use.--This year (1932) this stream was reported closed indefinitely for small-mouth bass propagation.

Spawning Grounds.--This is a spawning stream for small-mouth bass.

Recommendations

Designation.--The designation of this stream as a nursery stream is possibly desirable in the present lack of small-mouth bass propagation on any scale in the state. The difficulty of enforcing the closed regulation in such a large stream is great and will lead, no doubt, to repeated violation. But as soon as bass are available for stocking, this stream, if not sooner, it ought to be opened for fishing.

Stocking.--This stream would seem to call for stocking with small-mouth bass fingerlings.

Improvement.--In all probability the "improvement" will prove practicable and desirable, using such methods as have been developed chiefly for trout streams. The primary need is for small stone dams to create "holding basins," which should have some cover.



BOONE RIVER

EAGLE CREEK

Hancock, Wright, Hamilton and Webster counties

Wright County

Information given Salyer on July 31, 1932, by Dr. Lundell of Webster City.

Tributary to.--Boone River, near Woolstock.

Water.--"A clear water creek."

Spawning Grounds.--This is a spawning stream for small-mouth bass.

Recommendations

Designation.--This is not designated a closed, nursery stream. On the basis

of the facts presented to us, we would urge that it be kept open to fishing.

Stocking.--Small-mouth bass fingerlings.

Bottom.--"Very rocky."

Fish.--The lower part of this stream, in Hamilton County, provides good fishing for small-mouth and large-mouth bass and channel-cats, a few walleyes and quite a few rock bass.



## BOONE RIVER

Hancock, Wright, Hamilton and Webster counties

Information given Salyer, July 31, 1932, by Dr. Lundell of Webster City.

Water Supply.--Although this stream carries great quantities of surface water, it also is to a degree spring-fed. Thus at the McGlaughlin Bridge south of Woolstock there is a large spring in the river bed, and another large one in the west bank, some distance below. According to Dr. Lundell, the whole river receives many springs

Pollution.--Pollution by sewage is indicated at Webster City. Dr. Lundell did not indicate that this affected the fishing.

Width.--The Boone is 40 to 70 feet wide through Hamilton County, with pools 3 to 5 feet deep.

Bottom.--"Very rocky."

### Recommendations

Game Fish.--The lower part of this stream, in Hamilton County, provides good fishing for small-mouth and large-mouth bass and channel-cats, a few walleyes and quite a few rock bass.

basins for bass.



LIZARD CREEK

Lizard Creek, Palo Alto, Pocahontas and Webster counties

Information from Warden Ross W. Moses and Dr. Lundell, given to Salyer, July, 1932.

Tributary to.--Des Moines River at Fort Dodge.

Water Supply.--Heads in Lizard Lake.

Fluctuation in Flow.--Gets somewhat low in summer (Lundell).

Fishing Reputation.--This is a fair fishing stream, for river-run fish, below the mouth of the North Branch (Moses). The South Branch is similar to the North Branch, but not so good (Moses). A good creek for small-mouth bass (Lundell).

Recommendations

Designation.--Should be kept open for fishing.

Stocking.--Small-mouth bass fingerlings.

Improvement.--This stream obviously needs frequent small dams to make holding basins for bass.



LOTTS CREEK

Kossuth and Humboldt counties

Information given to Salyer by Warden Ross W. Moses in July, 1932.

The lower reaches of this creek provide fair fishing.

This is an undredged stream.

Tributaries.--Mostly run dry in summer.

Pollution.--Mr. Hert was probably correct in concluding that this branch is perhaps the most satisfactory part of the entire Des Moines River, from the pollution standpoint.

Oil wastes at Algona are said to kill fish in river below. It is reported that fish are inedible for miles on account of "kerosene taste."

Dam.--A loose rock dam just above U.S. 12 holds up 3 or 4 feet of water.

Shore.--All mud banks.

Temperature.--A warm stream: 81° F with air at only 66° F at 4:00 P.M. of July 17.

Water.--Boils badly after rains (as when seen).

Width.--30 feet (Algona).

Shade.--Stream shaded at Algona.

Fishing Conditions.--The best fishing is said to be obtained above the Dakota City Dam.

Recommendations

Stocking.--The East Branch is worth stocking with small-mouth bass. The pond above the dam at Dakota City should be provided with bass, creppies, catfish and other species.



## EAST DES MOINES RIVER

Emmet, Kossuth and Humboldt counties

Information given to Salyer by Warden Ross W. Moses at Emmetsburg, early in July, 1932. Stream seen at Algona on July 17.

This is an undredged stream.

Tributaries.--Mostly run dry in summer.

Pollution.--Mr. Hart was probably correct in concluding that this branch is perhaps the most satisfactory part of the entire Des Moines River, from the pollution standpoint.

Oil wastes at Algona are said to kill fish in river below. It is reported that fish are inedible for miles on account of "kerosene taste."

Dam.--A loose rock dam just above U.S. 18 holds up 6 or 7 feet of water.

Shore.--All mud banks.

Temperature.--A warm stream: 81° F with air at only 89° F at 4:00 P.M. of July 17.

Water.--Rills badly after rains (as when seen).

Width.--60 feet (Algona).

Shade.--Stream shaded at Algona.

Fishing Conditions.--The best fishing is said to be obtained above the Dakota City Dam.

### Recommendations

Stocking.--The East Branch is worth stocking with small-mouth bass. The pond above the dam at Dakota City should be provided with bass, crappies, catfish and other species.



BEAVER CREEK

Palo Alto and Pocahontas Counties

Information obtained by Salyer, July, 1932, from Warden Ross W. Moses of Emmet County.

This high water creek has some bass at times (in its lower half, Pocahontas

County). Pollution.--The only specific complaint heard was of oil pollution attributed to the Rock Island Railroad, and said to kill fish from Batherville to Wallingford (information from Warden Moses).

Dams.--Two power dams at Humboldt and one at Rutland are furthest upstream.

Drilled.--From Osgood six miles north of Humboldt to Bradgate in Humboldt County. Above Osgood the stream runs in its old bed.

Water.--Usually silty, but clears up more than some of the other streams in the fall.

Pools.--The stream has good holes where undredged.

Fishing History and Conditions.--Pike fishing in the holes, between Grattinger and the mouth of Jack Creek, in Palo Alto County, is reported to be good. Frogs are used for bait. The pond at Rutland affords good catfish and crappie fishing. Three years ago the fish are said to have smothered there after the flood gates were open.

Recommendations

Stocking.--We recommend the stocking of West Branch between Grattinger and the mouth of Jack Creek with moderate numbers of small-mouth bass and walleyed pike. The ponds near Humboldt and Rutland call for rather heavy stocking with bass, catfish and crappies.



ROCK RIVER

Lyon and Sioux counties

WEST DES MOINES RIVER

Emmet, Palo Alto, Pocahontas and Humboldt counties

Information gained by Salyer, July, 1932, largely from Warden Ross W. Moses

of Emmetsburg.

Water Supply.--Surface drainage; floods badly.

Pollution.--The only specific complaint we heard was of oil pollution attributed to the Rock Island Railroad, and said to kill fish from Estherville to Wallingford (information from Warden Moses).

Dams.--Two power dams at Humboldt and one at Rutland are furthest upstream.

Dredged.--From Osgood six miles north of Emmetsburg to Bradgate in Humboldt County. Above Osgood the stream runs in its old bed.

Water.--Usually silty, but clears up more than some of the other streams in the fall.

Pools.--The stream has good holes where undredged.

Fishing History and Conditions.--Pike fishing in the holes, between Graettinger and the mouth of Jack Creek, in Palo Alto County, is reported to be good. Frogs are used for bait. The pond at Rutland affords good catfish and crappie fishing. Three years ago the fish are said to have smothered there after the flood gates were open.

Recommendations

Stocking.--We recommend the stocking of West Branch between Graettinger and the mouth of Jack Creek with moderate numbers of small-mouth bass and walleyed pike. The ponds near Humboldt and Rutland call for rather heavy stocking with bass, catfish and crappies.



## ROCK RIVER

Lyon and Sioux counties

Temperature.-- $27^{\circ} \text{C} = 80.7^{\circ} \text{F}$  on July 20 (Hart), at Rock Rapids.

Water.--pH = 8.5 and D.O. = 4.0 p.p.m. on July 20 (Hart), at Rock Rapids.

Fish.--Hart mentioned "the Red Horse, *Maxostoma* sp. as being "the common form" in the Rock River above Rock Rapids. He saw, we suppose, *Maxostoma aureolum*.

Pollution.--Even in the headwaters west of Spirit Lake there is pollution, for stock wade in the water all along.

Country.--Treeless pasture land west of Spirit Lake. A lovely wooded valley surrounded by loess knolls from Sioux Rapids to Cherokee.

Water.--Muddy west of Spirit Lake.

Width.--10 to 30 feet wide west of Spirit Lake, somewhat larger at Spencer.

Depth.--Shallow (1 to 2 ft.) west of Spirit Lake, with a few deeper holes.

Bottom.--Muddy west of Spirit Lake (one sink 8 or 9 inches here), with sandy or stony intervals extending 4 or 5 rods. Becoming siltier at Spencer. A good sand and gravel bottom from Sioux Rapids to Cherokee.

Vegetation.--Magnificent beds of wapato (*Sagittaria*) along its course west of Spirit Lake; here also are frequent beds of *Sagittaria* as dense as to almost choke streams.

Natural Food.--Minnows common and crayfish numerous.

Game Fish.--Young pickerel west of Spirit Lake. Olcott's map carried an annotation to indicate that pickerel, pike, catfish and bullheads occur in the river above Cherokee. Were it not for the excessive silting after rains, this stream could undoubtedly be made to carry small-mouth bass.

Rough Fish.--Many carp and black buffalo west of Spirit Lake.

Forage Fish.--Fatheads and Plains silvery minnows (*Hybognathus* sp.)

collected here.



Recommendations  
LITTLE SIOUX RIVER

Dickinson, Clay, Buena Vista, O'Brien, Cherokee, Ida, Woodbury,

Monona and Harrison counties

Examined by Salyer over 3 miles of its course, 9 miles west of Spirit Lake, on July 30, 1932; at Spencer and from Sioux Rapids to Cherokee, on August 3.

Pollution.--Even in the headwaters west of Spirit Lake there is pollution, for stock wade in the water all along.

Country.--Treeless pasture land west of Spirit Lake. A lovely wooded valley surrounded by loess knolls from Sioux Rapids to Cherokee.

Water.--Muddy west of Spirit Lake.

Width.--10 to 30 feet wide west of Spirit Lake, somewhat larger at Spencer.

Depth.--Shallow (1 to 2½ ft.) west of Spirit Lake, with a few deeper holes.

Bottom.--Muddy west of Spirit Lake (one sinks 6 or 8 inches here), with sandy or stony intervals extending 2 or 3 rods. Becoming sandier at Spencer. A good sand and gravel bottom from Sioux Rapids to Cherokee.

Vegetation.--Magnificent beds of wapato (*Sagittaria*) along its course west of Spirit Lake; here also are frequent beds of *Ceratophyllum* so dense as to almost choke stream.

Natural Food.--Minnows common and crayfish numerous.

Game Fish.--Young pickerel west of Spirit Lake. Olcott's map carried an annotation to indicate that pickerel, pike, catfish and bullheads occur in the river above Cherokee. Were it not for the excessive silting after rains, this stream could undoubtedly be made to carry small-mouth bass.

Rough Fish.--Many carp and black buffalo west of Spirit Lake.

Forage Fish.--Fatheads and Plains silvery minnows (*Hybognathus placitus*) seined here.



### Recommendations

Stocking.---When the small-mouth bass rearing is well underway, we would suggest planting fingerlings in the stretch from Sioux Rapids to Cherokee. The planting should be continued for five years to give the stream a good trial, but should be discontinued after five years if no results of moment follow.

Tributary.---Little Sioux River just above Cherokee.

Temperature.---This is a warm creek (78° F on August 3 at 3:00 P.M., when the air was 80° F; [at highway bridge near mouth].

Water.---Silty when examined, but rapidly clearing after a heavy rain the previous night. General testimony indicates that this is a clear stream.

Width and Depth.---15 to 25 feet wide and 4" to 1 or 2 feet deep, at bridge near mouth.

Pools.---Holes as deep as 3 or 4 feet in upper course.

Bottom.---Sandy.

Fishing Reputation.---This stream is reported to support fishing from just above Paulina to its mouth just above Cherokee.

Game.---Mr. Specker and others have indicated that this stream no longer contains small-mouth bass, although there seems to be a very good prospect for establishing that species below Paulina.

### Recommendations

Stocking.---We recommend the stocking of small-mouth bass fingerlings in this stream, as it is a promising creek for this species, lying, however, in a generally bass-less region. There is a general demand (local wardens and sportsmen) for stocking this stream with small-mouth bass.

Dam.---We understand that some request has been made for the building of dams in this tributary of Little Sioux River, for the purpose of increasing the bullhead fishing. Mr. E.W. Neltcott of Paulina is a sponsor of the idea, and the place for which the damming is suggested is near Paulina, near the middle of the course of the stream.

From the evidence we have, but without having made a field examination of the



MILL CREEK

O'Brien and Cherokee counties

Examined by Salyer on August 3, 1932, at highway bridge above Cherokee. Other information from Speaker and several others.

Tributary to.--Little Sioux River just above Cherokee.

Temperature.--This is a warm creek (78° F on August 3 at 6:00 P.M., when the air was 82° F; (at highway bridge near mouth).

Water.--Silty when examined, but rapidly clearing after a heavy rain the previous night. General testimony indicates that this is a clear stream.

Width and Depth.--18 to 25 feet wide and 6" to 1 or 2 feet deep, at bridge near mouth.

Pools.--Holes as deep as 3 or 4 feet in upper course.

Bottom.--Sandy.

Fishing Reputation.--This stream is reported to support fishing from just above Paullina to its mouth just above Cherokee.

Bass.--Mr. Speaker and others have indicated that this stream no longer contains small-mouth bass, although there seems to be a very good prospect for establishing that species below Paullina.

Recommendations

Stocking.--We recommend the stocking of small-mouth bass fingerlings in this stream, as it is a promising creek for this species, lying, however, in a generally bass-less region. There is a general demand (local warden and sportsmen) for stocking this stream with small-mouth bass.

Dams.--We understand that some request has been made for the building of dams in this tributary of Little Sioux River, for the purpose of increasing the bullhead fishing. Mr. B.W. Weltoedt of Paullina is a sponsor of the idea, and the place for which the damming is suggested is near Paullina, near the middle of the course of the stream.

From the evidence we have, but without having made a field examination of the



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central part of this stream, we would think the suggested damming of this stream  
would be of material benefit to the sport fishery, and would provide fishing for  
other species than bullheads.



## MISSOURI RIVER

The paddlefish is reported by H.E. Hart as occurring in the Missouri at least as far north as the mouth of the Platte.

Water Supply.--Surface, no doubt. Formerly located in Old Harbor Lake, which drained itself by cutting through moraine.

Country.--Flows through an old glacial valley 400 ft. to 2 miles wide, with boulder-strewn ridges.

Dams.--It is claimed by Dr. Jansell, Mr. Mamotte and others that a series of three artificial lakes could easily be made here.

Game Fish.--We have reports of catfish occurring in this stream.



Middle Raccoon R.  
Raccoon R.  
Des Moines R.

#### WILLOW CREEK

Carroll, Greene and Guthrie counties

Information given Salyer by Dr. Lundell of Webster City, July 31, 1932.

Water Supply.--Surface, no doubt. Formerly headed in Old Dunbar Lake, which drained itself by cutting through moraine.

Country.--Flows through an old glacial valley 400 ft. to 3 miles wide, with boulder-strawn ridges.

Dams.--It is claimed by Dr. Lundell, Mr. Marnette and others that a series of three artificial lakes could easily be made here.

Game Fish.--We have reports of catfish occurring in this stream.



CAMP CREEK

Calhoun County

Tributary to.--Raccoon River, near western edge of Calhoun County.

Game Fish.--General reports given us indicate that this stream has good small-mouth bass possibilities, and that it actually contains some of this species now. The lake is very lowly affected, according to Hart, by short periods of drought.

Use.--Hart believes that this lake is only satisfactory for the propagation of bullheads and a limited number of pan fish. The time is not far off he believes when it will have to be discarded as a fishing lake. Then its chief importance would be a harbor for migrating water fowl.

Natural Drainage.--Hart reported that his dredging in this lake indicated a conspicuous scarcity of insect larvae.

Use of Lake.--Hart regarded the greatest value of this lake to the state to be for bullhead fishing, and as a harbor for waterfowl. He classed the lake as a bottom pond.

Algae.--"Due to poverty of the surrounding soil, the algae have not been able to gain a foothold. Analyses of the bottom of this lake showed it to be relatively poor in the amount of nitrogenous material that could be produced. Consequently the algae situation, <sup>and</sup> is automatically taken care of."  
(Hart)

Siltation.--According to Hart this lake is badly silted in as a result of "extensive agriculturalization within the water-shed." He found evidence of much soil erosion into the lake, as much as 4 feet of black silt was found in places.  
(See also "Notes".)

Water.--Not of too good quality, (Hart). The oxygen profile is very irregular according to Hart, but from his data (Table XIV and Graph XII) we do not see



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EMMET  
MUD LAKE, EMMET COUNTY

Information largely from 1932 Report of Harry E.

Hart. The lake was also seen by Mr. Salyer.

Water Supply and Fluctuation.- This lake is fed by rapid runoff from a limited water-shed. Mr. Harry E. Hart concluded that this lake should be relegated to the pond class due to its temporary water. The lake is seriously affected, according to Hart, by short periods of drouth.

Use.- Hart believes that this lake is 'only satisfactory for the <sup>propag</sup> preparation of bullheads and a limited number of pan fish. The time is not far off he believes when it will have to be discarded as a fishing lake. Then its chief importance would be a harbor for migrators) water fowl.

Natural Food.- Hart reported that his dredgings in this lake indicated a conspicuous scarcity of insect larvae.

Use of Water.- Hart regarded the greatest value of this lake to the state to be for bullhead fishing, and as a harbor for waterfowl. He classed the lake as a bottom pond.

Algae.- "Due to poorness of the surrounding soil, the algae have not been able to gain a foothold. Analyses of the bottom of this lake showed it to be relatively poor in the amount of nitrogenous material that could be produced. Consequently the algae situation <sup>here</sup> ~~produced~~ is automatically taken care of." (Hart)

Bottom.- According to Hart this lake is badly silted in as a result of "extensive agriculturization within the water-shed." He found evidence of much soil erosion into the lake, as much as 4 feet of black silt was found in places. (See also <sup>Algae</sup> "Vegetation".)

Water.- "Not of too good quality" (Hart). The oxygen profile is very irregular according to Hart, but from his data (Table XIV and Graph XIX) we do not see



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That the values fluctuated <sup>much</sup> ~~under~~ more than in other shallow Iowa <sup>lakes</sup> ~~lakes~~.

Depth.- "Mud Lake is deep enough to support bullheads". too shallow to be very satisfactory as a fish lake (Hart).

Vegetation.- Hart reportee that there is little or no vegetation in the lake proper. However, at normal water stage, the lake becomes connected with a couple of large sloughs which contain an abundance of rushes, grasses and cattails.

Walleyed Pike.- Hart reports that "an experimental planting of pike in this lake proved to be a decided failure."

Large-mouth Bass.- "Few or none" (Hart).

Silver Bass.- "Apparently none" (Hart).

Perch.- "Few caught" (Hart).

Crappies and Bluegills.- "Rarely caught", elsewhere, "Few if any caught". It is not apparent if these are actual records of occurrence.

Bullheads.- Mud Lake was classed by Mr. Hart as One of the best lakes in the state for bullhead fishing. But he stated that catfish are absent.

Coarse Fish.-

Sheepshead.<sup>R</sup>- "Few or none".

Buffalo.- "Practically none". The meaning of such records is doubtful, except as an expression of probable ignorance.

#### Recommendations

General.- Unquestionably this lake is dangerously shallow, but we hardly think the evidence sufficient to back up the view that it should be permanently abandoned for everything except bullheads and ducks.

Stocking.- We recommend that this lake receive <sup>some</sup> ~~source~~ of the surplus bullheads from the nursery lakes and rescue ~~seining~~. We further recommend that a good <sup>and</sup> plantery of crappies and some large mouth bass <sup>and</sup> bluegills be made, to give the lake a real test.



V-1: 1933

## HIGH LAKE, EMMET COUNTY

Information obtained by Salyer, July, 1932, and from Hart's report of 1932.

Water Supply and Fluctuation.—This lake is fed by rapid runoff from a limited water-shed. Mr. Harry E. Hart concluded that this lake should be relegated to the mud bottom pond class due to its "temporary nature". The lake is affected seriously, according to Hart, by short periods of drouth.

Bottom.—Due to excessive agriculturization within the watershed of this lake, according to Hart, it is badly silted. Although there is an abundance of mud, it is not excessively rich, since it comes from a region of light soils, Hart indicates. He found evidence of much soil erosion into the lake: as much as 4 feet of black silt was found in places.

Use.—The time is not far off, he believes, when it will have to be discarded as a fishing lake; then its prime importance would be as a harbor for migratory water fowl.

Water.—"Not of too good quality" (Hart). The dissolved oxygen is listed by Hart as varying from 4.7 to 11.8 p.p.m. from December 31, 1930, to February 5, 1931, and to be 7.3 p.p.m. on July 1. The pH on January 22 was 7.8.

Depth.—High Lake is even shallower than Mud Lake, according to Hart, because it acts in part as a basin in which silt settles out before the water goes into Mud Lake. He found slightly more than 3 feet of water.

Natural Food.—Hart reported that his dredgings in this lake indicated a conspicuous scarcity of insect larvae.

Vegetation.—This lake Hart found to carry very little submerged vegetation. However, at normal water stage the lake is connected with a couple of large sloughs which contain rushes, grasses and cattails in great abundance.

Algae.—This lake is not troubled with blue-green algae, according to Hart, who attributes this fortunate fact to the circumstance that the soils of the surrounding country are light, so that the bottom mud while thick is not excessively rich in organic matter.



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### Game Fish

Wall-eyed Pike.—According to Mr. Hart and to Warden Ross W. Moses of Emmetsburg the pike in High Lake were killed in November, 1931. Moses laid the death to a sudden drop in temperature to 60° F., while Hart laid it to the water becoming so shallow, and the decomposition so great as to cause the water to become stagnant and unfit for this class of fish. Hart using the date of late fall, 1930, referred to "a general upheaval" brought on by the <sup>h</sup>cilling of the upper layer of water, creating "a seething mass of partially decomposed organic material". Hart labelled the experimental plantings of pike as a failure and insisted that the lake never would be a pike lake.

Large-mouth Bass.—"Few or none" (Hart). Mr. Hart's 1932 report, that

Striped Bass.—"Apparently none" (Hart). satisfactory for extensive fish

Perch.—"Few caught" (Hart). condition of bottom and general condition

Crappies.—"Few if any" or "rarely caught" (Hart). It is doubtful if this is an authentic record of crappies occurring here. to be controllable. Our

Bluegills.—"Rarely caught" (Hart)—perhaps not a definite record. is

Bullheads are present, according to Hart, but there are no catfish.

### Coarse Fish

Buffalo: "Practically none" (Hart). This was probably not meant as a definite record of occurrence. This is of course a warm-water lake. Summer temperature

### Recommendations

Classification.—Mr. Hart believed that this lake is too shallow to be very satisfactory for <sup>h</sup>fishing, and also stated that it is "only satisfactory for the propagation of bullheads and a limited number of pan fish"; also for ducks.

We believe the evidence presented hardly warrants the abandoning of this lake for fishing.

Stocking.—We recommend that this lake be well supplied with bullheads, as from light, fish can live in the water" (Hart). Hart's lowest summer values for the nursery lake seining, and with enough crappies, large-mouth bass and bluegills to give it a real trial.



## LOST ISLAND LAKE, PALO ALTO AND CLAY COUNTIES

Water Supply and Fluctuations.- This lake is fed by surface drainage. It is subject to considerable fluctuations in level, ~~up~~ to four feet according to Hart, who wrote "records show that in 1912 this lake was so shallow that the fish all smothered during the winter. Practically all of the fish to be found in the lake have been placed there since that time."

Public Shooting Ground.- We recommend that 600 acres of good duck marsh below the lake be procured and made a public shooting ground. A Des Moines Insurance Company is said to own the property now.

General Policy.- The view expressed in Mr. Hart's 1932 report, that Lost Island Lake should be designated as unsatisfactory for extensive fish propagation due to unhealthful condition of bottom and general condition within the lake ~~is~~ was not verified by our examination. This is a defeatist policy, admitting that the lake is too productive to be controllable. Our view is that the excess productivity should be a blessing, as it surely is amenable to control. It ~~will~~ <sup>may</sup> require years of study to develop control measures, but surely these can in time be determined, if a real effort is made.

Temperatures.- This is of course a warm-water lake. Summer temperature up to 29 C (= 84.2 F) were recorded by Hart.

Water.- "Lost Island Lake, (graph 5 and 6) for the past two winters has presented a fairly uniform picture, as far as dissolved oxygen is concerned. The fluctuation being not greater than 4 p.p.m. for 1930 - 31, and 7 p.p.m. for the same period in 1931 - 32. The amount of oxygen present has always been well above the required 3 p.p.m. for the two winters." "As far as dissolved oxygen is concerned, the indications are, that if other conditions are right, fish can live in the water" (Hart). Hart's lowest summer values for



6.2  
D. O. were ~~5.2~~ p.p.m. (June 28 and July 7). Most of the summer analyses showed supersaturation.

The pH values vary some. In January and February (1931 and 1932), the pH records are 7.4 to 8.4, for the rest of the year, 8.0 to 9.3.

Bottom.- No doubt the bottom of Lost Island Lake away from shore has a very high organic content and does undergo decomposition. And no doubt the decomposition of this accumulated organic waste is responsible in large measure for the overdevelopment of obnoxious algae. So far we stand in agreement with Mr. Hart, but we do not know of any adequate basis for his supplementary reasoning: (1) The desirability of Lost Island Lake for fish propagation questionable; (2) dissolved oxygen is satisfactory; (3) other conditions are toxic compounds produced by bottom decomposition, and presence of food organisms; (4) the food is sufficient; (5) the success of fish planting therefore rests on the removal of toxic compounds in an orderly fashion; (6) this is the function of blue-green algae; (7) these algae are therefore decidedly beneficial, even though obnoxious and undesirable, and (8) conditions are relatively good in Lost Island, as compared with Storm Lake, because copper sulphate was not used in Lost Island Lake. We repeat that we do not follow this reasoning, and do not regard the premises or conclusions as being entirely correct.

Obnoxious Algae.- Lost Island is one of the "natural" (unpolluted) lakes which produces an excessive growth of obnoxious algae. This great growth of algae is without doubt attributable directly or indirectly to the inwash of organic material from the surrounding lands. Presumably the amount of organic material entering the lake has greatly increased with agriculture and stocking raising, that is from fields and barnyards. However, it is entirely reasonable that Lost Island Lake went through the history that Silver Lake in Dickinson County has just gone through (an excessive weed growth which on dying accentuated the septic condition of the bottom so that the major plants could



scarcely grow in it. The enriched water then supported the obnoxious algae).

The algae of Lost Island Lake become obnoxious chiefly as they are washed ashore in great quantities to rot. No alarming quantity of fish life is reported to have been destroyed in this lake.

Vegetation.- "The lake carries but few higher water plants. In fact one would be justified in classing them as absent"(Hart).

Mr. Hart did not know whether the surface algae screened off too much light to allow the <sup>large</sup> ~~layer~~ plants to grow, or whether the ratio of phosphates to nitrogen was too low in the lake bottom to support the weeds. We doubt either explanation, but agree that the obnoxious algae are abundant for some reason associated with the near absence of large plants.

The vegetation is <sup>insufficient</sup> ~~indifferent~~ either to shelter fish or to attract ducks.

Natural Food.- "A sufficient amount of food is present in this lake to support fish life" (Hart). This is obvious in view of the extremely high production of bullheads.

#### Game Fish

Northern Pike.- Hart reported that a few are caught, and that more are desired locally.

Large-mouth Bass.- "Few or none" (Hart).

Striped Bass.- "Apparently none" (Hart).

Perch.- "A good many caught"(Hart).

Crappies.- "A few" (Hart).

#### Rough Fish

Sand Sturgeon (Scaphirhynchus platyrhynchus).- Hart reported the taking of a <sup>specimen</sup> ~~receiver~~ of this species in Lost Island Lake in the summer of 1930. This is a most unexpected record, but of course not impossible.



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Stocking.- This lake gives a tremendous yield of bullheads, and should be annually stocked with large numbers (up to 150,000), preferably those taken from the nursery lakes. Planting of northern pike would be in order, provided the species can be or will be propagated or obtained from the rescue operations. The annual stocking with 100,000 fingerlings of mixed game and pan fish is also desirable, these to be preferably from the Mississippi rescue work. Species to be included: catfish, large-mouth bass, crappies, bluegills, perch, warmouth bass, etc.



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