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Salmon
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Selection of
river for
Maine
Department
of
Fisheries

Selection of a river in Maine for experiments in stocking and management
practices on Atlantic salmon

by

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The comprehensive program for restoration of the salmon runs of New England must await assignment of funds and personnel. In the meantime we are attempting to obtain information that takes a long time to gain and thus will later facilitate the carrying out of this program. This is being done through small scale experiments in stocking and management practices in cooperation with the Maine Departments of Inland Fisheries and Game and of Sea and Shore Fisheries. For this purpose a preliminary reconnaissance was made during June 23-26, 1941, to examine the most suitable stream for carrying out experiments on Atlantic salmon.

The most important conditions to be met in selecting one of these streams for experimental studies are:

1. In view of the limited funds and personnel the stream must be small enough so that weirs for counting the smolts descending to the sea and of adult salmon returning can be maintained at a minimum of expense.
2. The stream must be sufficiently accessible to keep the expenses of transportation, shelter and moving of equipment at a minimum.
3. The stream must not be polluted to more than a slight extent.
4. The river must not be blocked by high dams or other obstructions that would entail great difficulty and expense for fish protection works.

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5. The maximum water temperatures must not be sufficiently high to endanger the young salmon which usually spend one or two summers in the stream before descending to the sea.

6. Since one desired object of the experiments is to test the feasibility of restoring and maintaining salmon runs in streams from which they have been wholly exterminated in the past, but which now appear to be suitable for salmon, it is preferable that the stream should not contain any remnants of a natural run.

It may be noted that Atkins (1877) and Kendall (1935) list 22 rivers in Maine in which salmon runs have occurred. Although not possessing any documentary evidence, I believe from reports of old residents that the Pemaquid River can safely be added to this list. Most of these streams can be eliminated from the present selection by one of the above limitations.

Thus the St. Croix, Penobscot, Androscoggin, Kennebec, and Merrimac can be eliminated at once on account of their size.

Of the rivers east of the Penobscot, the Union River is obstructed by a very high dam and four others contain remnants of natural runs. The remaining four have not been considered because of the second point, accessibility.

Of five small rivers in southern Maine, the Presumpscot and possibly the Royal have too much pollution, and the remainder were found by Dr. Gerald Cooper to have high maximum temperatures.

This process of elimination left a group of four rivers in central Maine, the Sheepscot, Medomak, St. Georges and Pemaquid.

These four rivers were each examined at several points during the period June 23-26, 1941. On June 23, after a conference with Commissioner Stobie in Augusta, I visited the Sheepscot River below Long Pond accompanied by four members of the Department of Inland Fisheries and Game, Dr. Gerald Cooper, In Charge of Stream and Lake Surveys, Mr. Gerry Wade, In Charge of Hatchery Operations and Wardens Winfield Foster and Charles Head. Mr. Beveridge of the Portland Press-Telegram also accompanied the party.

On June 24 Dr. Cooper, the two wardens and I visited the upper Sheepscot and upper St. Georges River. On June 25 Warden Charles Head and I inspected the upper Pemaquid, lower St. Georges and Medomak Rivers, and on June 26 I visited the lower Pemaquid, which I had inspected on previous trips.

In this preliminary examination particular attention was paid to obstructions that could block the salmon's migrations, and to the suitability of the stream bed for spawning purposes and for the habitat of the young salmon. The streams were at an extremely low stage making observation of the bottom comparatively easy, as well as showing what to expect in the way of a minimum stream flow. The weather was sufficiently hot, so that, combined with the exceptionally low stream flow, the water temperatures encountered are probably only a very few degrees below their summer maximum; but this point will be tested during the summer and fall.

The main features of each river have been tabulated in the following table. Note that the Medomak and Pemaquid Rivers are both very short rivers rising at low elevations.

SUMMARY OF CONDITIONS ON FOUR MAIN RIVERS

	Rivers:			
	Sheepscot	St. Georges	Medomak	Pemaquid
Approximate miles of narrow tidal estuary	6.0	6.1	2.0	1.0
Upper limit of river considered	Outlet. Sheepscot Lake.	Outlet. St. Georges Lake	Outlet. Medomak Pond.	Outlet. Pemaquid Pond.
Reason for omitting river above	Very little flow	Head waters	Swamps above	Tributaries swampy
Miles tidewater to limit considered	21.6	35.8	9.7	10.0
Mileage through lakes	3.0	6.5	0.0	3.6
Approximate square miles of lakes drained by river	6.2	10.0	1.6	3.8
Miles below first impassable dam	0.0	0.6	0.0	5.2
Miles below second impassable dam	13.1	11.8	2.5	. . . . .
Miles below third impassable dam . . . . .	. . . . .	13.1	9.5	. . . . .
Miles below fourth impassable dam . . . . .	. . . . .	20.0	. . . . .	. . . . .
Miles below fifth impassable dam . . . . .	. . . . .	25.0	. . . . .	. . . . .
Rough estimate of flow c.f.s. June 23-26, 1941				
At mouth	8	10	5	5
At upper limit considered.	5	8	5	5
Temperature range of water June 23-26, 1941	70.7-77.4(6)	71.6-73.9(4)	72.5(1)	68.9-71.6(3)
Distance upriver to first fair spawning ground observed	20.5	0.5	2.0	0.5
Distance to first good spawning ground observed	21.0	2.6	2.0	4.5
Elevation at upper limit considered	281	505	125	76

Stream Flow.

Observations made on the Pemaquid at various times since last September, show that it has maintained its rate of flow remarkably well. On March 19, 1941, it had a flow of about 50 cubic feet per second, the present figure of 5 c.f.s. is merely an estimate, but reflects the relative change. In March the Sheepscot River flow at Head of Tide was many times greater than that of the Pemaquid. At that time I judged the main Sheepscot River to be too large to screen effectively without great expense, but considered the possibility of using a tributary. At the present water levels, however, it becomes apparent that the Sheepscot has not tributaries with sufficient flow for experimental purposes.

It appears highly probable from observation of the stream beds that the Georges and Medomak Rivers never attain nearly as great a maximum flow as the Sheepscot, yet during the present extremely dry spell they have maintained their flow much better.

Temperature.

The lowest temperature recorded, 68.9°F., was on the Pemaquid River at Bristol, the highest, 77.4°F., was on the Sheepscot River at Whitefield. Below Cooper's Mills the bed of the Sheepscot River at the four points visited was chiefly rocky ledges and boulders which have a tendency to raise the temperature considerably in hot weather. Since a long series of temperatures are needed to discover whether or not the water becomes too warm for salmon, this point need not be stressed now.

Obstructions.

Considering obstructions to salmon migration, all four streams have a dam at or barely above the influence of the tide. This lower dam on the Pemaquid has a fish ladder passable for salmon which permits them to ascend five miles to a concrete dam at Bristol. Since this dam also marks the upper limit of the spawning beds and of any fair current, it is not necessary to consider it.

The Medomak River has a log dam about six feet high at its mouth. A fish ladder could be built over this dam at a reasonable cost that would permit salmon to ascend $2\frac{1}{2}$ miles to Winslow Mills and give them access to fair spawning grounds below this dam. A second fishway over the dam at Winslow Mills, which is built of rocks and about ten feet high, would permit salmon to ascend another $5\frac{1}{2}$ miles to within $1\frac{1}{2}$ miles of Medomak Pond where there is a board dam about five feet high that should offer little difficulty as far as building a fishway is concerned.

The Sheepscot River also has a dam at its mouth. This dam is about twelve feet in height and constructed of solid concrete with high concrete abutments. A ladder over this dam would entail considerable expense. Unless the stream bed is considerably different in the sections of river not observed (which the warden assures us is not the case) there are no suitable spawning grounds below Long Pond. This means that there are two more dams to surmount before salmon could reach fair spawning beds.

The second dam is at Whitefield (King's dam) $4\frac{1}{2}$ miles above Head of Tide, and has been abandoned. It is about six feet high, of concrete construction, and has a break at the west end that is passable to salmon. However, it would be desirable to blow it out as leaks at the other end may furnish a considerable counter attraction to fish migrating upstream.

The third dam at Cooper's Mills, 13 miles up the river, has been abandoned for three years. Built of large rocks and concrete, it approximates twelve feet in height. The river is commencing to wash out the west bank but the dam is still impassable to salmon and would require a fairly expensive ladder unless it could be blown out.

At the mouth of the St. Georges River, there is a twelve foot dam of log construction. It has a fish ladder built through funds raised jointly by the mill owners and public subscription. The fishway itself is suitable for salmon but the entrance does not seem to be too well located. This fishway permits salmon to ascend less than a mile to a second dam at the Upper Falls. Below this second dam there is a stretch of about 150 yards of fair spawning ground. However, in order to provide sufficient stream for the young salmon it would seem necessary to construct a fishway over the second dam.

The Upper Falls dam is about ten feet high of rock and log construction. At present it has an alewife ladder on the east bank that is wholly unsuitable for salmon on account of its size and its location. A proper fishway over this dam would permit salmon to reach excellent spawning beds about 2 miles farther upstream at Heart Falls. They could also ascend as far as Union, 12 miles upstream from the mouth.

The next 13 miles of the St. Georges are blocked by two dams below Sennebec Pond. The first one is an eight foot log structure at Union Village that does not appear to be in use. It would present little difficulty. The second dam is a twelve foot solid concrete structure owned by the Central Maine Power Company. At present the power is being used by a company making snowplows but they are planning to leave this site. The flume from this dam to the power mill is about 1/4 mile long and at present water levels is carrying at least half of the water in the stream, even though only part of this amount appears to be going into the mill. This dam would present considerable difficulty and expense if it were to be made passable for salmon. The dams at North Appleton and Searsmont need not be considered now, as it would not seem advisable to expend effort on them unless salmon can be established in some numbers in the lower portions of the stream.

Pollution.

Pollution does not present a serious problem on any of these four rivers. The Pemaquid appears free from pollution, except for the possibility of slight amounts of domestic sewage at Bristol and accumulations of shavings where it enters tide water below Poole's Mill. On the Medomak River the small sawmill at the third dam (about one mile below Medomak Pond) is allowing fresh sawdust to pour into the river. On the Sheepscot River the large sawmill at Head of Tide has a large accumulation of mill waste piled well into the main channel. On the St. Georges River fresh sawdust is continually falling into the river from the sawmill at North Appleton, but this is probably too far upstream to affect the lower reaches. However, the woolen mill at Warren discharges dyestuffs below the dam. Because of the small amount and the fact that high tide reaches the dam probably this is not serious, at least it seems to have no effect on the alewife run.

Summary.

In summarizing the conditions on these four rivers it is apparent that each one has certain advantages and certain disadvantages.

The Pemaquid River has the best temperature conditions and is not obstructed over the portion that is suitable for spawning but it is very short (only 5 miles). Then too it is now being used in an experiment with king salmon and the spawning beds are hardly extensive enough for large runs of both species.

The Medomak River is somewhat longer but in order to obtain more than the first $2\frac{1}{2}$ miles of river, two fishways are required.

The Sheepscot has both length and a fair gradient but will require two fishways, one quite expensive. In order to reach fair spawning grounds, the salmon have to ascend 21 miles passing through Long Pond. Since Long Pond is stocked with landlocked salmon, both sea-run and landlocked salmon would utilize the same spawning beds and the young would use the same portion of the stream. This fact would make it very difficult to obtain the necessary information on stream mortality since it is very unlikely that the young of the sea-run and landlocked salmon could be distinguished. The large flow of the Sheepscot during higher water periods would make it difficult and expensive to maintain a screened weir for counting the smolts.

The St. Georges River contains the best spawning grounds observed, and one fish ladder over the log and rock storage dam at the Upper Falls would open up the first 13 miles of the river which contains these beds. About 3 miles above the best spawning beds and about midway of this 13-mile stretch, Fuller Brook enters the St. Georges. The temperature of this brook on June 25 was only 57° F. This cold water tributary might be very valuable in saving young salmon during any extremely hot spell.

In the following table the advantages and disadvantages of each river have been tabulated.

COMPARISON OF THE FOUR RIVERS EXAMINED

River	Advantages	Disadvantages
Sheepscot	Good length. Good gradient.	Needs two fishways, one expensive. Maximum stream flow too large for experimental work. Spawning grounds same as for landlocked salmon. Temperatures highest.
Pemaquid	Lowest temperature. Stable flow. Good spawning beds. Needs no more fishways.	Stream short. Being used for king salmon.
Medomak	Large area of spawning beds.	Needs two fishways. Stream short. Reduced flow in dry weather due to small lake storage.
St. Georges	Best spawning beds. Good length. Good gradient. Stable flow.	Slight pollution. Needs one fishway now to open up 13 miles for present experiment, but four dams in upper reaches.

In conclusion I would recommend on the basis of the above data that the St. Georges River be chosen as most suitable for this experiment, provided that proper provision can be made for regulation of the catch, building of the necessary fishway, approved screening of water intakes and maintenance by the dam owners of a minimum stream flow.

In obtaining the information on which this report is based, the personnel of the Department of Inland Fisheries and Game rendered valuable assistance. Wardens Winfield Foster and Charles Head were of great aid through their intimate knowledge of the topography of the region. Mr. Gerry Wade and Dr. Gerald Cooper gave many helpful suggestions. Dr. Cooper's knowledge of Maine waters was especially valuable.