RECONNAISSANCE OF MASHPEE RIVER IN REGARD TO SUITABILITY FOR SALMON

Made April 16, 1940, by Dr. George A. Rounsefell, Assoc. Aquatic Biologist, Bureau of Fisheries, United States Department of the Interior.

Data

This is only a preliminary survey based on what points could be covered in one day, but it indicates certain possibilities and so we present it with our interpretation.

Source of Mashpee River

The source of the river is Wakeby Pond and Mashpee Lake. These two lakes are said to vary from about 30 to 60 feet in depth with a maximum of about 90 feet. The upper lake, Wakeby, is connected by a deep channel, perhaps 300 yards wide with Mashpee Lake so they are in reality one large lake. The shores of these lakes are composed of clean, coarse gravel. They have no visible inlet, so that, aside from what little surface water they can gather from a very limited watershed, they must derive their water from springs. The water of these lakes is clear and colorless, the temperature on April 16 was 44°F at the surface, the air being 45°F, sky overcast. In area, Mashpee Lake scales roughly about one and one-third by one-half miles and Wakeby Pond about one by one-half miles. The two lakes, with their connecting channel represent a water area somewhere between one and two square miles.
Fishway

Below Mashpee Lake is a pond, about one-half acre in extent, used at times as a rearing pond. At the base of the spillway from this rearing pond, a fish ladder of easy grade connects with Mashpee Lake. This fish ladder is said to be used by alewives that spawn annually around the shores of the lakes, and is of very easy grade. There are no other barriers on this river.

River

From Mashpee Lake to Highway 28, a distance of about two miles in a direct line the river flows down a narrow valley, densely wooded with small hardwoods and a few pines. The stream winds throughout this stretch but is everywhere quite swift. (About $2\frac{1}{2}$ to 3 feet per second in the center). It is well shaded over this entire distance and brush and vegetation grow to the water's edge. There is no evidence of any freshets.

Water flow

Although the river is colorless as it flows from Mashpee Lake it acquires a brownish tinge as it proceeds and is a light brown color at Highway 28. The stream averages about 12 to 18 feet in width and as the banks are fairly steep there can be but little change in width with diminished flow. The warden that patrols the stream for the lessees estimated the summer water height as not more than three to four inches lower than its present height. Since this stream is spring-fed with little watershed and shows no signs of freshets this appears to be a reasonable statement. The amount of water flow was estimated from depths, widths
and velocities at two stations, one about one-half mile and the other about one mile above Highway 28. At the lower station the depth averaged 12 inches over a 15-foot width, being 18 inches in the center. At the upper station the depth averaged 10 inches over a 14-foot width, being 14 inches in the center. The calculated stream flow was 435 cubic feet per second at the lower station and 388 at the upper station. These values are rough approximations, but it is safe to conclude that the flow is probably between about 350 and 450 cubic feet per second. Throughout this stretch of stream there are small springs entering at intervals from the sides of the valley. These springs are colorless and vary in size from quantities barely sufficient to fill a one-inch pipe to several about 5 to 10 times as large. They are reliably reported to flow throughout the summer.

A stream height of four inches less than that found would give a stream flow of 321 c.f.s. at the lower station and 269 c.f.s. at the upper station, if the velocities remained the same. Since this is improbable it can only be said that the summer flow would probably be somewhere between one-half and two-thirds the present flow if the water height were four inches less.
Pools

Because of the narrowness of the valley and the uniform gradient, without any boulders or bedrock, the stream is swift throughout the stretch from Highway 28 to Mashpee Lake. There are no deep pools, three feet being about the maximum depth noted. In many places where the stream is cutting against a bank, log rafts have been placed on the surface to afford lurking places for trout. However, there were no real pools in any of the portions of the stream observed.

From Highway 28 to where the stream enters Poponesset Bay was not covered except for casual observation of the upper section. This stretch measures about two miles and is through a wider valley. The gradient is less and the stream meanders through open country without shade.

Bottom

The stream is devoid of bedrock or large boulders, the only obstruction to the current consisting of snags and drift logs. The bottom is composed chiefly of coarse sand and fine gravel, (up to about \( \frac{1}{3} \) inch). This gravel is of good consistency for spawning purposes, but the current is so swift that there may be considerable shifting of these gravel bars.
Suitability for salmon

There are several factors to be evaluated in determining the suitability of Mashpee River for salmon. First we can consider the volume of water. The summer flow of Mashpee River is not known but if the minimum is somewhat below 269 c.f.s. (see above) it should be sufficient. Similar sized streams are used by migrating salmon on the Pacific Coast. The three following streams, for instance:

<table>
<thead>
<tr>
<th>Stream</th>
<th>Flow (c.f.s.)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>August</td>
</tr>
<tr>
<td>Duckabush</td>
<td>177</td>
</tr>
<tr>
<td>Dosewallips</td>
<td>394</td>
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<tr>
<td>Green</td>
<td>186</td>
</tr>
</tbody>
</table>

The summer temperatures are unknown, but judging from the amount of shade, the source of the water and the incidence of many small springs, it seems improbable that it could be a limiting factor. The stream is apparently quite suitable for brook trout so this factor need not cause worry.
Next we must consider the possibilities for natural spawning. The two miles of stream from Highway 28 to Mashpee Lake have fine gravel bars throughout. This gravel is sufficiently coarse for salmon spawning, but there should be more quiet water, and additional depth is desirable. Since the stream is heavily shaded a number of fair-sized pools should not tend to add greatly to the water temperature. If the water temperature is unnecessarily low in summer due to the spring water sources a rise in temperature would actually aid in promoting the growth of the young salmon, and the slight fall at each pool would keep the water thoroughly aerated. Salmon will stand quite high temperatures in water containing plenty of oxygen. These pools could probably be made easily with simple log barriers.

The number of salmon that this stream could support is problematical, and depends largely on the amount of food and shelter available during the young salmon's freshwater existence. Since young Atlantic salmon usually attain a size of 5 to 6 inches before going to the sea, spending two summers and two winters in the stream, it would require a considerable amount of food. Perhaps the coho or silver salmon (*Oncorhynchus kisutch*) would be better adapted to this stream. In similar streams in the Puget Sound region the young cohos go to sea in the late spring after one summer and one winter in the stream, at a length of 100 to 130 millimeters (about 4 to 5 inches). The adult cohos will run up streams of any size from the largest to the smallest.
The coho averages about 8 to 15 pounds in weight and furnishes excellent sport fishing. In Puget Sound they mature at 3 years of age, contrasted with 4 to 6 years in the Atlantic salmon.

Any attempt to introduce either or both species to this stream must be considered strictly in the nature of an experiment. Success cannot be guaranteed. Any plan to be given a fair trial should be carried out for more than one year and should first contemplate the formation of more quiet water in the stream. A sufficient number of young salmon should be liberated below Mashpee Lake to insure a fair return of adults if the plan succeeds. If these salmon return, they will of course be subject to fishing in Poponesset Bay, and this factor must be considered in determining the advisability of the experiment.