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SALMON RESTORATION IN NEW ENGLAND

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Atlantic salmon (Salmo salar) once were abundant in nearly all of the larger New England rivers, as well as in numerous smaller streams. Today, there is a mere remnant of these runs in the Penobscot and Dennys Rivers, and in a few other streams in eastern Maine.

The destruction of these salmon runs was due to many factors. In the early years they were heavily fished for food due to their easy accessibility while on their upstream migrations. At the same time, many small dams, usually built in the tributaries of the main rivers, served to cut off spawning grounds and rearing areas for the young. Other developments assisted in destroying salmon runs in the rivers not blocked by dams. During the settlement of New England, thousands of square miles of forest cover were removed resulting in reduced summer stream flow, increased temperatures, intensified freshets, and silting up of spawning beds. Low water and high temperature were particularly serious when coupled with pollution arising from settlements along the rivers.

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With the survival of the salmon runs already in danger, New England entered an intensified industrial phase. With increasing power requirements the construction of dams was extended to the large rivers while pollution from sewage and sawdust was increased by industrial wastes from tanneries, pulp mills and chemical works. The combination of unfavorable circumstances all but exterminated the salmon from New England. During the following years of continued adverse conditions, a few salmon were maintained in eastern Maine streams chiefly by means of imported Canadian eggs and artificial propagation at Federal and State hatcheries.

The situation eventually improved with the passing of the peak in agricultural and industrial development. The reversion to forest of thousands of acres of once cultivated farm land increased stream flow and lowered temperatures. Rivers became less obstructed due to the decline in logging operations and the construction of fishways in many permanent dams. A decrease in sawmill wastes was coupled with some reduction of other pollution owing to a more enlightened public opinion. The cumulative effect of these various trends apparently has improved conditions on some of the rivers to the point where the restoration of salmon appears to be a practical possibility.

Aware of the growing interest in salmon, Mr. David Aylward, President of the National Wildlife Federation, requested the Fish and Wildlife Service for a report on the possibilities for salmon restoration, and for suggestions as to the best way in which it might be carried out. The authors, working in cooperation with Mr. George Stobie, Commissioner of Inland Fisheries for Maine, and with the advice of the commissioners of the other North Atlantic States, and of Mr. Raymond Dow and other sportsmen, made a study of information available and submitted a report reviewing present conditions, together with a recommended program for restoration work. The balance of our paper covers a resumé of this report.

New England salmon already were on their way toward practical extinction long before the development of present methods of scientific fishery management. The various measures taken in the past to prevent their decline were handicapped by worse environmental conditions than now prevail, in some of the rivers at least, and by a lack of sufficient study of the various problems involved. This point is well brought home by a quotation from the late Dr. William C. Kendall in his monograph on the Atlantic Salmon, published in 1935:

"Notwithstanding the early fish cultural interest in the Atlantic salmon of New England, the continued fish cultural propagation of the fish at one Federal hatchery in Maine, and its potential commercial and angling value, no attempts to solve the many problems connected with the salmon have been made since those of Atkins over one-half century ago.

" . . . to me it seems not only extremely unfortunate, but fatal that so much reliance has been placed upon the applicability of the results of investigations on the other side of the ocean and so little done in the way of independent investigation. Canada has made and is still making some effort in that direction, but in the United States almost nothing has been done in the past, and absolutely nothing is being done now, with the consequence that her Atlantic salmon fishery is almost past history and the salmon is verging on extinction."

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Some excellent work is being done in Canada to maintain her runs of Atlantic salmon, but the problem in New England is somewhat different. Canada is concerned with maintaining present runs whereas the New England problem is to reestablish salmon in rivers from which, with possibly one exception, they have been almost or completely exterminated. We believe that with the necessary and continued cooperation of the sportsmen, the commercial fishermen and the several states, it is entirely within reason, judging from the size of the rivers and the potential spawning areas, to reestablish salmon runs of a magnitude beyond that visualized today by most sportsmen and fishermen. Such runs, under carefully management, should supply sufficient salmon to meet the needs of the sportsmen, and in addition, would provide, with regulated fishing, a supplementary income of great value to the smaller fishing communities along the coast where the small-boat fishermen are finding it difficult or impossible to compete effectively with the mass production of fish from the offshore banks. However, if we are to accomplish the above results, it will be necessary to follow out a carefully conceived and extensive program. In our opinion, this program must include the following points.

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The first point requires an adequate survey of all of the most promising New England rivers to discover:

1. The number and kind of obstructions to salmon migrations and the adequacy of fishways or other protective devices at these barriers.

2. The extent and degree of pollution and its limiting effect on migrations and spawning.

3. The condition and extent of the spawning areas.

4. The suitability and capacity of the streams for young salmon.

Some of this survey work is now being carried on by various states as rapidly as funds permit. Additional work under this program would be in cooperation with the several State biologists, and would supplement and coordinate their work.

The second point calls for the selection, on the basis of the survey, of one or more of the streams showing satisfactory spawning and nursery areas and a lack of impassable barriers or pollution. Initial restoration efforts should be concentrated on the most favorable rivers for two reasons: first, to provide an example to encourage the cleaning up of less favorable streams; second, to establish self-perpetuating runs as early as possible to provide a source for additional eggs to be used in work on other streams. Furthermore, it is obvious that unless natural runs can be established in the best rivers, there is no use in wasting time and money on more polluted or obstructed streams.

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Point No. III involves the securing of State laws prohibiting or severely limiting the capture of salmon on the test river or within a suitable distance from its mouth for a period of ten years (or such period as the survey indicates is necessary). Without such initial protection, restoration has only a slight chance of success.

Point No. IV requires the taking of an annual census of the number of spawning adults. This can be done by counting at a weir or fish ladder, or on the spawning grounds. In this way it will be possible to determine the returns from given amounts of stocking and from natural spawning.

Point V requires that a supply of eggs be obtained for hatching and planting each year for at least five years to establish runs in the principal portion of the river. The Federal hatchery at Craig Brook, Maine, has facilities for hatching and rearing the quantities required for this work. After runs have once been established, outside sources of eggs will be unnecessary as sufficient quantities should be available from the established runs to supply material for stocking in additional tributaries and later in other streams.

A hatching and rearing program will play an essential part in the general program to supply material for primary stocking of streams. However, on the basis of present knowledge it does not appear practical to attempt to use hatcheries as the basis for regular large scale runs. These must be based on natural spawning. However, it is possible that there may be some special cases where the combination of high recreational value and inadequate spawning grounds will make it practical to maintain limited runs by means of artificial propagation alone.

Point VI in the program calls for the marking of both wild and hatchery-reared parr and smolts to determine:

1. The relative value of different tributaries for spawning and nursery grounds.
2. The best age and season of the year to release hatchery stock.
3. The optimum size of spawning run for each tributary.

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Point VII deals with the management of the test stream after it is opened to fishing. After ten years, or less, should results be sufficiently successful, the stream would be opened to controlled fishing, the amount of fishing permitted to be determined by the results of annual observations. The basic consideration in determining the catch would be that there should be left an annual spawning run sufficient to build up and maintain a self-perpetuating stock at the most productive level. This is the basis on which the Service has rebuilt and maintained the tremendous salmon runs of Alaska.

Point VIII proposes a more thorough study of the practical possibility and of the possible advantages or disadvantages to be derived from the introduction of a more desirable West Coast species than the pink salmon previously tried in Maine waters. It is believed that those species of Pacific salmon which furnish excellent sport fishing should be considered in a well-rounded program. It is worthy of note that the steelhead, the western counterpart of our Atlantic salmon, is most abundant in rivers highly populated with other salmons, and this may well be a reflection of the fertilization of these waters by the dead salmon.

As the program points out, the most important problem today is to provide definite proof that extensive restoration of Atlantic salmon is feasible. If this can be demonstrated on one or two streams, ample support should be forthcoming for similar restoration on others. The initial program should extend over a period of about ten years and will require several trained biologists for stream surveys, tagging, marking, and other life-history work. Funds for this program are not now available.