

## XXVIII.—DIRECTIONS FOR USING BLANKS FOR RECORDING THE PROPAGATION AND DISTRIBUTION OF FISH.

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A series of blanks has been prepared for the purpose of facilitating the record of the artificial propagation and distribution of fishes in the United States. They will also, if carefully and fully filled out, supply excellent data for determining the influences of natural agencies upon the abundance of the food-fishes, their periods of migration, and the hatching of the spawn. For example, the record of the temperature of the air and water, together with that of the fish taken, will afford definite conclusions as to the effect of a cold late spring in retarding the migrations of the shad; while a comparison of the same temperatures with the numbers of spawn taken and hatched will show the effect of a high temperature upon the vitality of the eggs.

TABLE A is intended to record the operations at a hatching-station where the eggs are taken from the parent fish and either hatched, or distributed after the development has partially advanced.

Thus if the operation of hatching shad is being carried on at South Hadley Falls, Mass., the reading would then be:

RECORD of *shad-hatching* operations conducted at *South Hadley Falls, Mass.*, on the *Connecticut River*, from *July 20, 1874*, to *August 22, 1874*, on account of *Connecticut State Commissioners*, by *Charles C. Smith*.

The column under LINE, No., relates to the numbering of the lines from top to bottom. The column under DATE relates to the day of the month in which the work was performed. In the HOUR-column are to be given the hours of the day in which the physical observations of temperature, wind, condition of sky and water and of tide are made. As many successive lines should be appropriated for these records as observations have been repeated at different hours during the day. Thus, if observations are made at 7 a. m., 12 m., and 7 p. m., three lines are required. The record of *Air* and *Surface-water* temperatures needs no explanation. In the record for *Bottom-temperature*, the depth should be specified. If it is always at the same depth, recording it at the head of the column once is sufficient. The *Direction* of the WIND may be given approximately from the eight points of the compass most commonly referred to. The *Intensity* may also be expressed in the words Gentle, Fresh, Strong, Gale, Hurricane, &c. The *CONDITION* OF *Sky* may be specified by the words Clear, A few light clouds, Cloudy, Cloudy with showers, rain, &c.; the *CONDITION* OF *Water* as Clear, Muddied, Very turbid, &c. TIDE can be referred to by using L for low water and H for high water; approximately half-way between these points of the tide by  $\frac{1}{2}$ . The record

under SEINE HAULED should give the hours of the day between which successive hauls were made, and the number of seine-hauls in the time specified. Under FISH TAKEN should be recorded the entire number of shad from the seine-hauls, divided, according to sex, under *Males* and *Females*; under RIPE FISH, the number of "spawners" and "milters" under *Male* and *Female* respectively. EGGS OBTAINED is intended for the total number of eggs for the day. The PERIOD OF HATCHING can be obtained without difficulty or error if the spawning-boxes are numbered and a record made of the date and hour when the eggs are placed in each box. This record and the following ones have, of course, no reference to the date in the preceding column. The LOSS will be estimated with more or less accuracy according to the method used for the purpose. Under REMARKS, a variety of record incident to the day may be inserted: as, "The temperature of the water was so high that the eggs impregnated showed no vitality;" or, "The heavy northwest wind and sea capsized twenty-five of the boxes;" or, "50,000 young fish from eggs impregnated on July 24 and 25 were released into the river."

TABLE B is for the operations of hatching-houses which have received eggs from stations at the streams where they have been impregnated and carried forward to the point of development when they can be shipped with safety.

The blank, if filled out for Vermont, would read :

RECORD of operations of *M. C. Edmunds*, fish-commissioner of Vermont, conducted at *Charlestown, N. H.*, in hatching and distributing young of *Penobscot River salmon*, from *October 22, 1874, to January 5, 1875.*

The heading LINE, No., relates to the numbering of the lines from the top of the page downward; the DATE refers to the time at which the eggs were received; under RECEIVED FROM, the Government or State commission or other source contributing the eggs is to be recorded; WHENCE RECEIVED relates to the locality of the spawn-procuring station; TIME OF JOURNEY, from the date at which the eggs were packed for shipment to the time of their arrival at the hatching-station and the transfer to the hatching-troughs; GENERAL CONDITION refers to their condition on arrival; under NUMBER OF EGGS RECEIVED: *From the United States*, relates to those supplied by the United States Commission; *From other sources*, all others, and *Total* the sum of these two supplies; LOSS IN UNPACKING means the bad eggs that have been injured before arrival, which may include all that give evidence of loss of vitality within twenty four hours after they have been put in the hatching-apparatus, providing, of course, that there is no evidence apparent of injury from other causes than those incurred in transportation; FISH HATCHED is intended to include all that emerge from the egg, except such as may hatch prematurely from injuries received during the transportation of the eggs; the YOUNG DISTRIBUTED relates to the number that are put alive into their destined waters; WHERE PLANTED

should include the name of the main river, the name of the tributary, and the name of the town, city, or village near where the fish are planted; the column of REMARKS may include anything important incident to the series of facts recorded, as loss in journey to point of distribution; as, "Bellows Falls, Vt., only five fishes;" or, "An accident to the railroad delayed the train some hours, the weather was warm, and the fish in such precarious condition that they were put into the Connecticut River to save them, though they were intended for the Merrimack River."

TABLE C is for record of distribution of any species of fish from the hatching-establishment to the waters in which they are planted. It should be filled out even where reference has been made to the distribution in TABLE B, as it contains the details of the transfer and planting more fully than the latter. Filled out it might read: RECORD of distribution of *shad* made from *June 23, 1875*, to *July 5, 1875*, by *Jonathan Mason*, under the direction of the United States Commission of Fish and Fisheries.

NO. OF LINE refers to the numbering of lines from the top of the page downward; DATE OF TRANSFER, the time of placing the fish into the cans; OBTAINED FROM, the fish-commission or private source supplying the eggs; PLACE WHERE TAKEN, the name of the hatching-station whence fish were obtained; PERIOD OF JOURNEY, the time the fish were in the cans; NUMBER OF FISH *Originally taken*, the number put alive into the cans; *Actually planted*, the number put alive into the destined waters; INTRODUCTION OF FISH includes *Place*, name of nearest town, village, or city; *Stream* refers to the name of the tributary in which the fish are placed, and *Tributary of*, to the name of the main river; TRANSFER IN CHARGE OF, to the person having the responsibility of the fish *en route*; REMARKS, to any important incident of the transfer.

The following specimen-tables will illustrate the nature of the data to be recorded:

Record of *shad-hatching* operations conducted at Washington, D. C., on the Potomac River, from July 20, 1875, to August 22, 1875, on account of United States Commission, by Mason & Welsher.

Line No.	Date.	Hour.	Temperature of—			Wind.		Condition of—		Tide.	Seine hauled.	Fish taken.		Ripe fish.	Eggs obtained.	Period of hatching.	Loss.		Remarks.	
			Air.	Surface-water.	Bottom. (30 feet deep.)	Direction.	Intensity.	Sky.	Water.			Males.	Females.				Number.	Per cent.		
1	July 28	7 a. m.	76.8	69	68	N. N. E.	Gentle	Clear.....	Roily.....	L.										
2	.....	12 m.	79	77.5	76	E. N. E.	Fresh..	Light clouds..	Moderately clear.	II	7.30 a. m. to 1 p. m., 8 times.	112	265	20	6	75,000	3 days 13 hours.	4,000	5	Fish released July 31.
3	.....	7 p. m.	77.4	77	76	S. W.	Gentle	Cloudy.....	Clear.....	L.										
4	.....	11 p. m.	77	76	75.85	S. S. W.	Strong.	Heavy clouds.	Clear.....	½	8 p. m. to 11 p. m., 4 times.	265	265	43	31	400,000	3 days 2 hours.	12,000	3	Fish released July 30.

B.

Record of operations of G. C. Anderson, fish-commissioner of New Jersey, conducted at Bloomsbury, N. J., in hatching and distributing young of California salmon, from October 22 to January 5, 1875.

Line No.	Date.	Received from.	Whence received.	Time of journey.	General condition.	Number of eggs received.			Loss in un- packing.		Fish hatched.		Young dis- tributed.		Where planted.	Remarks.
						From the United States.	From other sources.	Total.	Number.	Per cent.	Number.	Per cent. of eggs.	Number.	Per cent.		
1	Oct. 22	United States Commissioner.	McCloud River station.	9 days 2 hours.	Fair..	225,000	.....	225,000	23,000	10	191,250	85	80,000	....	Delaware River.	No loss.
2													75,000	....	Susquehanna River.	Loss, 300.
3													22,000	....	do .....	Loss, 550.
4													15,000	....	Raritan River	Loss, 350.
Total distribution .....													190,000	99 1/2		

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Record of distribution of shad made from July 27, 1874, to August 5, 1874, by Oren Chase and C. D. Griswold, under direction of Connecticut fish-commission.

No. of line.	Date of transfer.	Obtained from—	Place whence taken.	Period of journey.	Number of fish—		Introduction of fish.			Transfer in charge of—	Remarks.
					Originally taken.	Actually planted.	Place.	Stream.	Tributary of—		
1	July 27	Massachusetts Commission.	South Hadley Falls, Mass.	7 hours...	100,000	97,000	Burlington, Vt....	Winooski River..	Lake Champlain..	Oren Chase.	
2	July 29	.....do.....	.....do.....	6 hours...	90,000	88,000	New Milford, Conn.....	.....	Housatonic River.	C. D. Griswold.	
3	July 31	.....do.....	.....do.....	20 hours...	100,000	96,000	Mattawamkeag, Me.,	Mattawamkeag, River.	Penobscot River..	Oren Chase and C. D. Griswold.	
4	Aug. 3	.....do.....	.....do.....	5 hours...	100,000	90,000	Vergennes, Vt....	Otter Creek.....	Lake Champlain..	Oren Chase.....	
5	Aug. 7	.....do.....	.....do.....	53 hours...	20,000	19,500	Detroit, Mich.....	Detroit River....	Lake Erie.....	O. Chase and C. D. Griswold.....	
6	Aug. 7	.....do.....	.....do.....	60 hours...	80,000	79,800	Ionia, Mich.....	Grand River.....	Lake Michigan.....	.....do.....	