

SH
155.8
N33



Northwest and Alaska Fisheries Center Processed Report*

DESCRIPTION AND PROPOSED TEST OF THE AUKE BAY INCUBATOR MODEL 76

by

Frederick H. Salter*

January 1977

Library DEC 13 1984
U.S. Department of Commerce-NOAA
Auke Bay Fisheries Laboratory
P.O. Box 210155
Auke Bay, Alaska 99821

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northwest Fisheries Center
2725 Montlake Boulevard East
Seattle, Washington 98112

* This report does not constitute a publication and is for information only. All data herein are to be considered provisional.

DESCRIPTION AND PROPOSED TEST OF THE

AUKE BAY INCUBATOR MODEL 76

by

Fred H. Salter

January 1977

Northwest and Alaska Fisheries Center Auke Bay Fisheries Laboratory
National Marine Fisheries Service, NOAA
P. O. Box 155 Auke Bay, AK 99821

DESCRIPTION AND PROPOSED TEST OF THE

AUKE BAY INCUBATOR MODEL 76

This is a proposal to determine causes of premature migration of fry in incubators, and to test recent changes in the design of the Auke Bay Incubator (Salter 1975). The latest design of the Auke Bay Incubator ("Model 76") will be used in the tests and is described and illustrated in detail.

Background

The Auke Bay Incubator was first tested during the fall and winter of 1974-75 with pink salmon fry at the Auke Creek Hatchery (Bailey, Pella, and Taylor 1975). Survival from eyed egg to fry was very good (probably over 95%; Taylor, personal communication) even at the extremely high densities tested (74 eyed eggs per square inch of substrate). In addition, the fry from the Auke Bay incubators were longer and heavier than wild fry or fry from any of the several other kinds of incubators tested. Also, the weight of fry produced per gallon of water flowing through was far greater in the Auke Bay Incubator than in other incubators (Bailey et al. 1975). The only significant problem encountered with the first version of the Auke Bay Incubator was a tendency for the fry to migrate early.

The Auke Bay Incubator was tested with pink salmon again in the fall and winter of 1975-76 by Bailey, Taylor, and Pella. Again, the only significant problem encountered was early migration of fry.

In early spring of 1975 it was decided to test the effects of different depths and orientation of the substrate, Astroturf* with different egg densities (the original incubator used a single layer of Astroturf placed horizontally 1 inch deep). Bailey, Pella and Taylor felt that because of the great number of eggs and number of the standard Auke Bay incubators required to conduct the tests a small version of an upwelling incubator should be used. These incubators were 9 inches square and from 6 to 24 inches high so that substrate up to 18 inches deep could be tested.

The 1975-76 tests also included standard size Auke Bay incubators with some design changes (Model 75) including artificial substrate (Astroturf, 1 to 6 inches deep) oriented vertically and horizontally, some with laminar flow and some with upwelling flow.

*Use of trade names does not imply endorsement by the Northwest and Alaska Marine Fisheries Service, NOAA.

The tests indicated that the incubators with turf placed vertically produced more and larger fry than did those with turf placed horizontally. Incubators with upwelling flow had a false bottom with 3/32 inch perforations. Upwelling flow was far superior to the laminar flow in incubators with no false bottoms. An adjustable dam used in Auke Bay incubators proved to be extremely useful. It allowed the operator to control the water level over the substrate and facilitated insertion and removal of the egg trays from the front of stacked incubator units, thus making it possible to stack the units and reduce or eliminate the space between units.

The Model 75 incubator incorporated a substrate assembly in a cartridge form which greatly eased its installation and removal and reduced time needed to clean the substrate. A removable front on the incubator also simplified the removal of the substrate cartridge and false bottom for cleaning.

The results of tests in 40 small upwelling incubators indicated that deeper substrate (up to 18 inches) produced longer and heavier fry than shallower substrate. Deeper substrate also reduced early migration of fry. If the indicated results of the 1975-76 tests with small incubators also occurs when incorporated in the Auke Bay Incubator Model 76, most of the known biological problems with artificial incubators will have been eliminated. The report "Effects of Substrate Depth, Seeding Density, and Water Flow on the Production of Pink Salmon Fry from Incubators Using Plastic Turf" by Bailey, Pella, and Taylor (1976), supplies the details of the 1975-76 experiments.

NEW FEATURES TO BE TESTED IN THE AUKE BAY INCUBATOR MODEL 76

Several new features of the Auke Bay Incubator are to be tested in 1976-77 but the major one is a substrate depth of 18 inches. Also being tested is a new egg holding basket, a detachable aerator, a new fry separator, and different mechanism for operating the adjustable dam.

Originally the trays used to hold the incubating eggs were shallow with a square mesh bottom. To make it easier for alevins to get to the drop below the egg tray, the holes are narrow enough that the eggs cannot fall, but the newly hatched alevins, being relatively long and slender can easily slip through. The holes are 4 or 5 times longer than they are wide.

This year, the hatchery is testing the use of a 2-hour saltwater bath once a day to kill the fungus on eggs instead of using malachite green. If this is successful, then having all the eggs in one basket instead of on separate trays should save space and also the cost of constructing many trays versus one basket.

A detachable aerator on the face of the new incubator aerates water after it falls over the adjustable dam and enroute to the next lower incubator.

The new adjustable dam simplifies the incubator since the fry collector unit is fastened to the face of the dam, making it all one unit. The adjustable dam is locked in the desired position with a simple cam.

The new fry separator is made from stock aluminum sheet with 1/16-inch X 1-1/4-inch perforations. This new separator is much cheaper and easier to fabricate than the earlier plastic model.

A fry lockin screen is placed at the top of the new incubator, and when the dam is raised up to the screen, the fry can not migrate.

OPERATION OF THE AUKE BAY INCUBATOR MODEL 76

The following are significant operations involved in the use of the latest version of the Auke Bay Incubator. Trays or baskets will be loaded with eggs outside the incubator and then slid into the incubator from the front. The water will be below the level of each tray or basket and the water level will be raised only after each tray or basket is in place. After the eggs have hatched and the alevins have fallen through the trays or basket, the water level will be lowered and the trays or basket removed. The adjustable dam is then raised up against the fry lock-in screen until it is near the time for the fry to migrate. At this time, the dam will be lowered a little to allow the fry to pass over the dam and down the fry separator into the fry collection chamber.

After all of the fry have left the incubator, the drain plug will be removed to drain the incubator prior to cleaning.

THE NEW FEATURES OF THE AUKE BAY INCUBATOR MODEL 76

The basic design and construction details of the Auke Bay Incubator, model 1976, are identical to models 1974 and 1975 (Salter, 1975a, 1975b) and only the features unique to model 1976 are discussed here.

1. The adjustable dam (item 5 in figures) has been re-designed to (a) accomodate deeper egg trays, (b) keep distance between lip of dam and fry collector constant, (c) simplify operation, and (d) reduce construction costs.

2. A horizontal fry lock-in screen (item 10 in figures) which covers the entire water surface is mounted at the top of the incubator and is always in place. By raising the dam to the screen, the alevins or fry are locked in.

FIGURES 1 TO 6

Figures 1 to 6 illustrate key features of the Auke Bay Incubator, Model 76. The names of components indicated in the figures are given in the following numbered key.

AUKE BAY INCUBATOR MODEL 76 - Names of Components

1. Housing Section
2. Incubator Unit
3. Adjustable Dam
4. Adjustable Dam Seal
5. Fry Collection Chamber
6. Fry Collection Tube
7. Fry Separator
8. Egg Trays
9. Egg Basket
10. Fry Lock-In Screen
11. Clean-out Rod
12. Drain Plug
13. False Bottom
14. Substrate (Astroturf)
15. Aerator
16. Front Assembly Unit

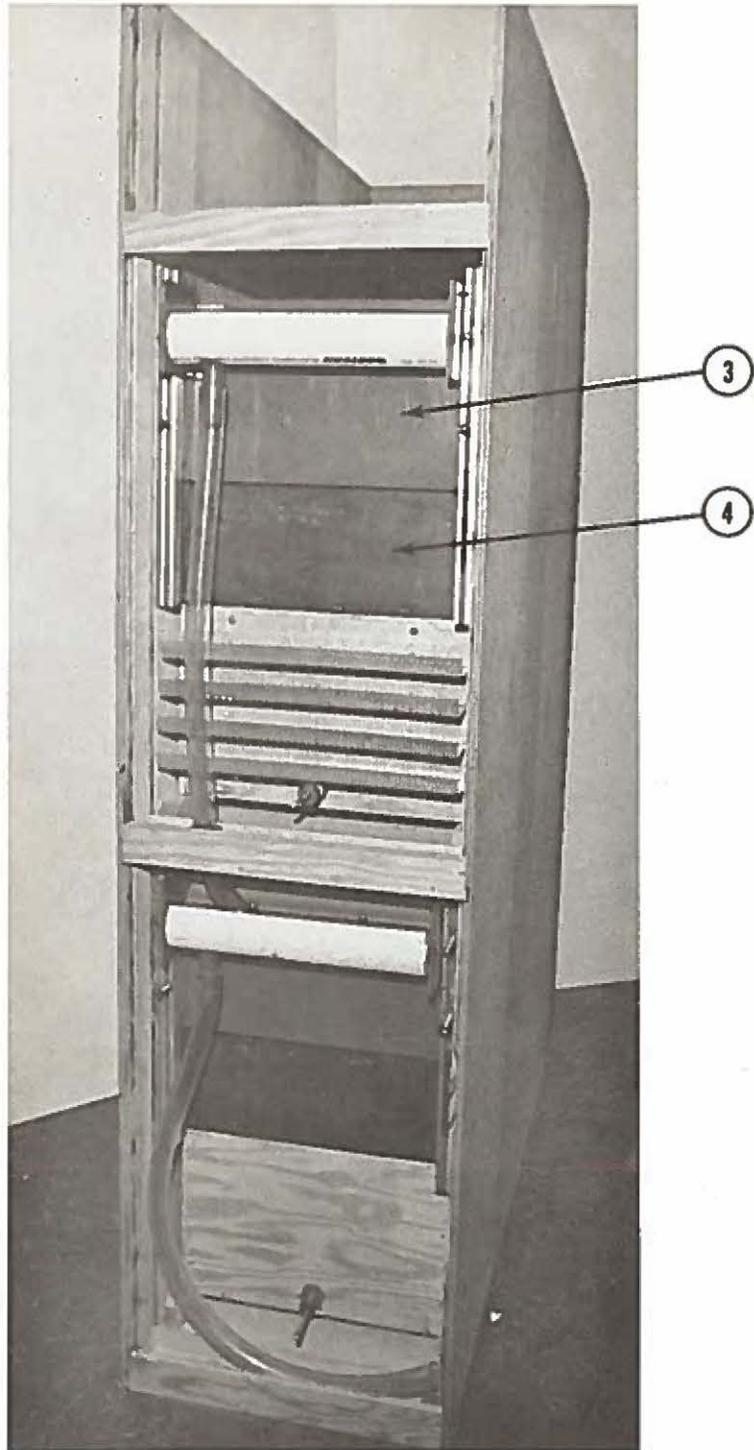


FIGURE 1.--AUKE BAY INCUBATOR MODEL 76

Showing housing section with incubators in place. The adjustable dams (3) are in the operating position.

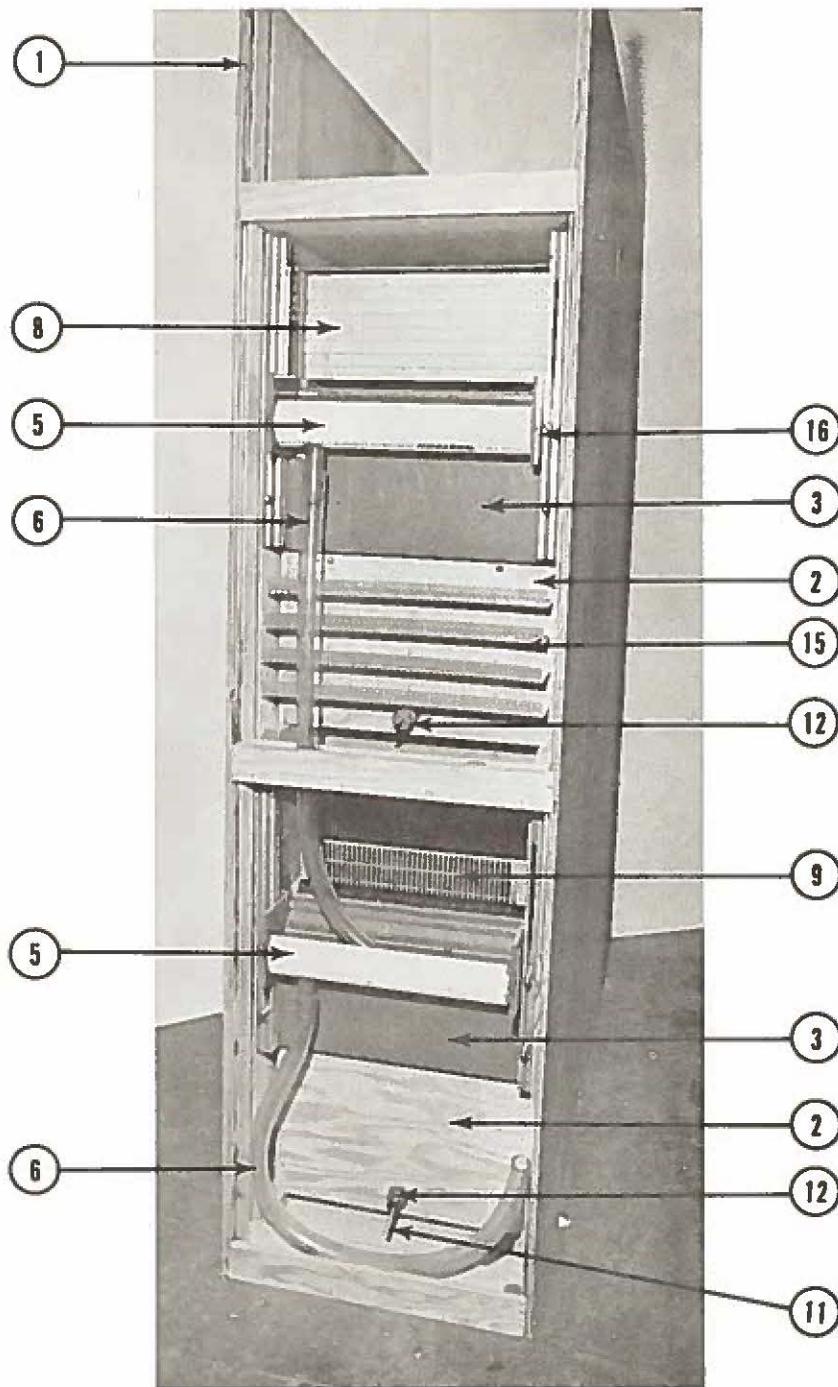


FIGURE 2.--AUKE BAY INCUBATOR MODEL 76

Showing housing section (1) with incubators in place with adjustable dams (3) lowered so that the trays (8) or basket (9) can be removed.

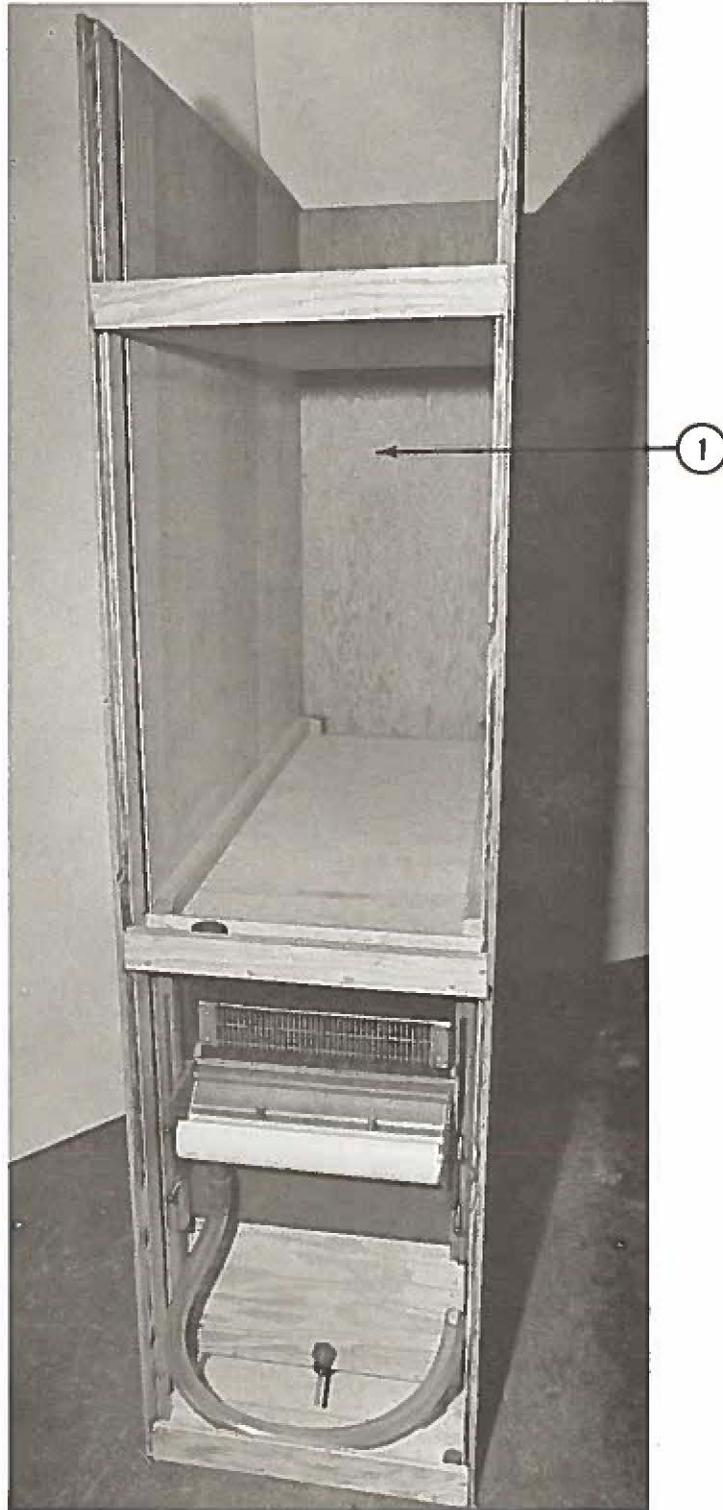


FIGURE 3.--AUKE BAY INCUBATOR MODEL 76

Showing the housing section (1) with the top incubator out and the housing interior exposed.

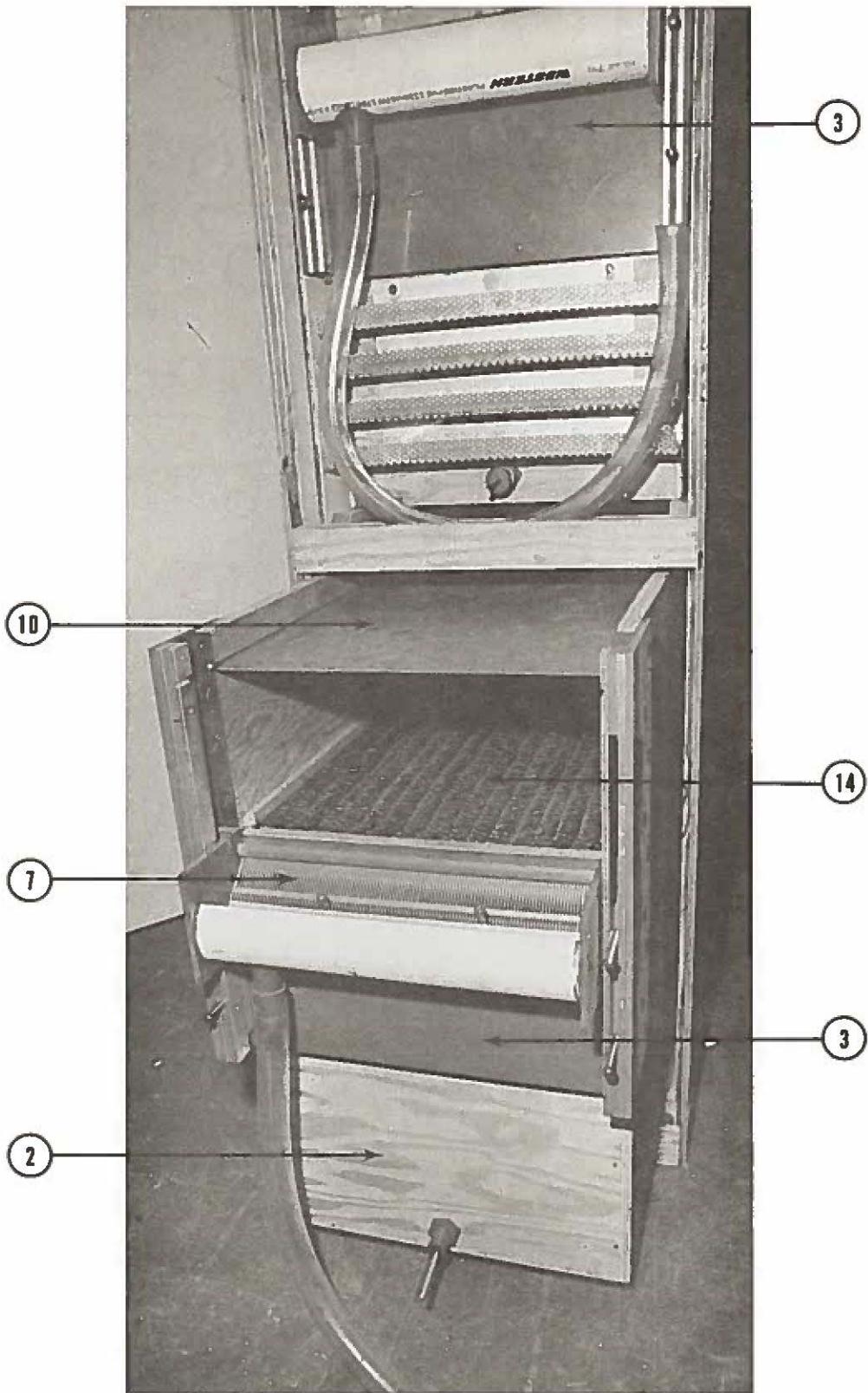


FIGURE 4.--AUKE BAY INCUBATOR MODEL 76

Showing one incubator (2) partly out of the housing section. The lower incubator shows the adjustable dam (3) lowered, the fry separator (7) in place. It also shows the vertically oriented astroturf substrate (14).

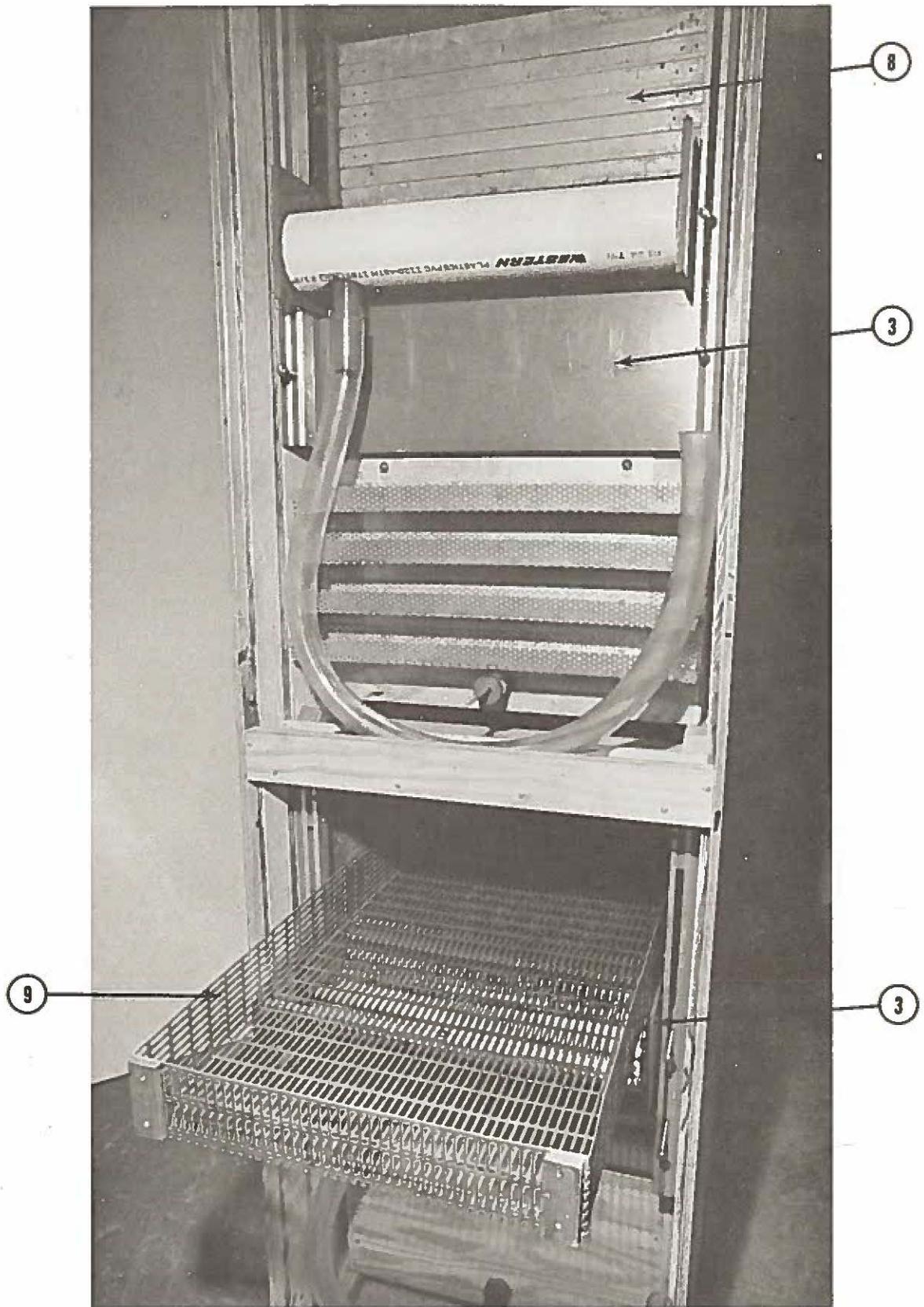


FIGURE 5.--AUKE BAY INCUBATOR MODEL 76

Showing the adjustable dams (3) lowered on both incubators, the trays (8) exposed on the top incubator, the basket (9) partially out of the lower incubator.

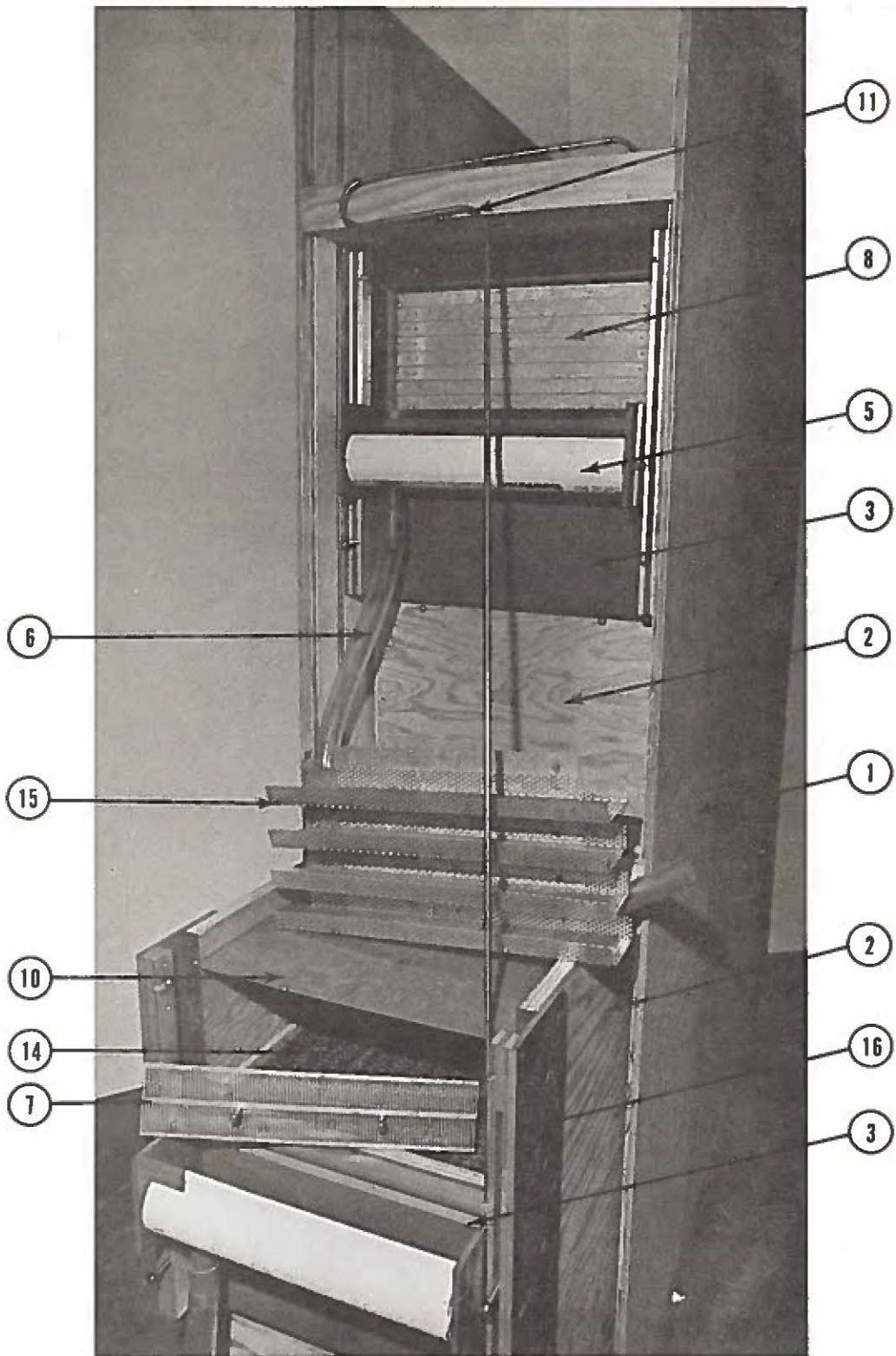


FIGURE 6.--AUKE BAY INCUBATOR MODEL 76

Showing the lower incubator partially out of the housing section. The aerator (15) is detached from the top incubator, the clean-out rod (11) is hanging loose on the housing section and the fry separator (7) is out of the fry collection chamber (5).

LITERATURE CITED

BAILEY, J. E., J. J. PELLA, and S. G. TAYLOR

1975. Report of progress on a pilot study of the feasibility of producing high quality salmon fry from artificial environments---1974 brood production.

NWFC, ABFL. Processed Report: 31 p.

BAILEY, J. E., J. J. PELLA, and S. G. TAYLOR

1976. Effects of substrate depth, seeding density, and water flow on production of pink salmon fry from incubators using plastic turf.

NWFC, ABFL. Processed Report.

SALTER, F. H.

1975a. A new incubator for salmonids designed by Alaska Laboratory. Marine Fisheries Review 37 (7):26-29.

1975b. Description and proposed test of the Auke Bay incubator Model 76.

NWFC, ABFL. Processed Report: 4 p.