Plastic Turf Substitute for Gravel in Salmon Incubators

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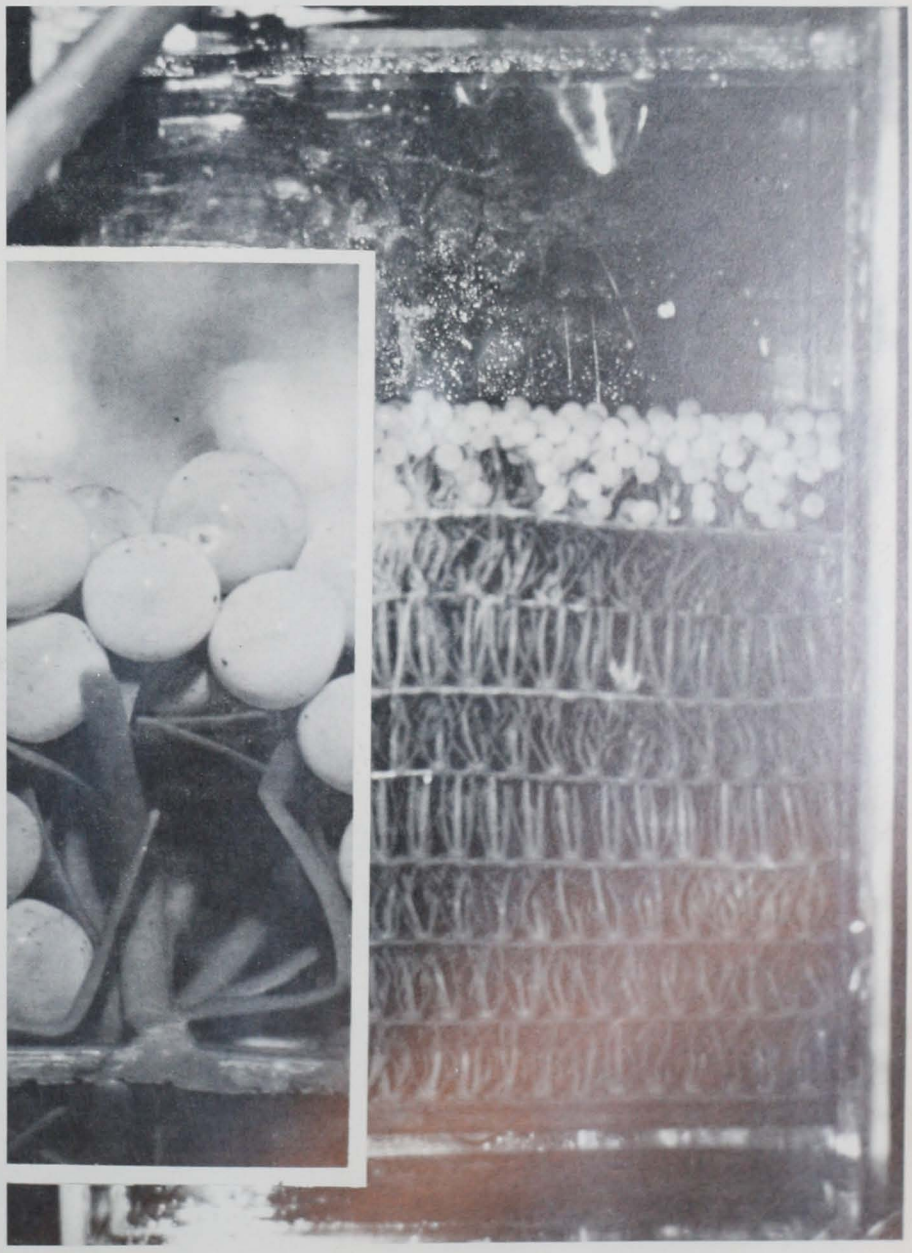


Pink salmon eggs are hatched on the top layer of AstroTurf in a 10 cm by 20 cm by 30 cm deep incubator with an upwelling flow of water. The alevins move down to the underlying layers of turf where they complete their development to the emergent fry stage. The insert is a magnified view of the eggs (actual diameter about 6 cm) on the top layer of turf.

Gravel is the natural substrate for incubating salmon eggs and alevins. Although eggs can be incubated successfully in trays or other types of containers with smooth substrates, alevins tend to be more active on smooth substrate than on gravel. This increased activity leads to premature swimming and contributes to poor conversion of yolk to body tissue, resulting in undersized and frequently abnormal fry. New types of hatchery systems, called gravel incubators, can avoid these problems. Gravel incubators do work, but because of the high cost of labor, materials, and transportation in Alaska, a system is needed that requires a minimum of lightweight material and can be transported to remote areas by air.

Scientists of the National Marine Fisheries Service (NMFS) have raised pink salmon, *Oncorhynchus gorbuscha*, to the fry stage in an incubator that is efficient in space and light in weight because the substrate is plastic turf (Astro Turf[1]). The incubator is located in an experimental hatchery near the Auke Bay Fisheries Laboratory, where NMFS and the Alaska Department of Fish and Game began cooperative tests with gravel incubators in 1971. The Astro Turf was modified for use in the incubator by removing the cloth backing and about one-half of the grasslike tufts, thus widening the spaces between tufts. Eight layers of

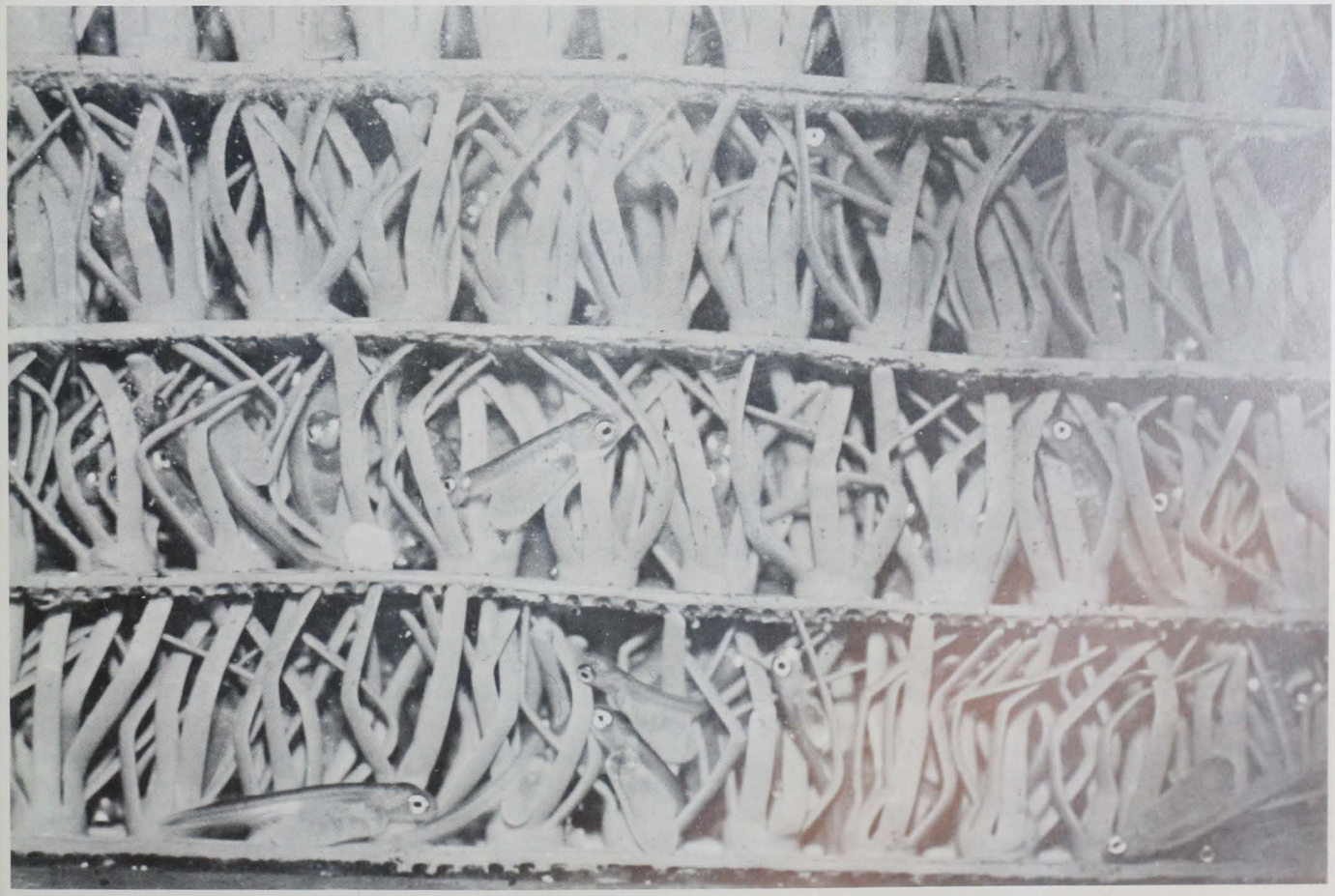
[1]Astro Turf Landscape Surface, Type CH-4, Monsanto Co., St. Louis, MO 63166. Reference to trade name does not imply endorsement by the National Marine Fisheries Service, NOAA.

The seeding of deep gravel boxes for salmon fry production requires a significant amount of heavy labor.

After the fry leave gravel incubators, the gravel must be removed, washed, and hauled to a storage bin.

(Above) Pink salmon eggs were incubated to the emergent fry stage in this transparent box with eight layers of AstroTurf.

(Below) In this closeup view, the pink salmon alevins are evenly distributed among layers of AstroTurf.



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the turf were placed on the bottom of a transparent plexiglass box 10 × 20 × 30 cm deep. The box was covered to exclude light except for brief periods when it had to be inspected.

In November 1973, 1,424 eyed pink salmon eggs were placed on the surface of the top layer of turf. An upwelling flow of 761 ml/min was supplied. The eggs hatched normally, and within 3 days the alevins fell or swam down through the spaces in the turf until they reached the bottom layer. During the next 2 or 3 weeks, the alevins distributed themselves until they were evenly dispersed in all but the top one or two layers of turf. They continued to occupy the lower six or seven layers until they emerged as fry. The peak of emergence occurred in April concurrently with the peak of emergence of fry from gravel incubators. Survival from eyed eggs to fry in the incubator with the turf substrate was 98 percent.

The high porosity of AstroTurf and the low density of the plastic relative to gravel are responsible for its superiority as substrate in our incubators. For example, to raise 1 million eggs would require about 120 square feet of floor space with incubators filled with gravel versus only 40 square feet with incubators filled with turf. These incubators would require about 13 cubic yards (about 36,000 pounds) of gravel but only 3.2 cubic yards (about 530 pounds) of AstroTurf. This large quantity of gravel must be graded by size, washed, and shoveled by hand into and out of the incubators. Moreover, turf is easier to clean and store in the off-season.

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NOAA/NMFS Developments

NMFS Inspection Aid Offered Fish Plants

A new inspection service for fish processing plants is now being offered by the National Oceanic and Atmospheric Administration. The processing plant itself is the target of inspection rather than the food items produced.

The service, rendered by NOAA's National Marine Fisheries Service, is expected to benefit both manufacturers and consumers of seafoods. It was established partly in response to many requests for such a service from owners and operators of processing facilities. Heretofore, plant inspection was available only as a part of the more comprehensive (and more expensive) product inspection service offered by the Commerce Department agency.

Under the new system, officially put into operation early last summer by notice in the Federal Register, NMFS will help fish processing plants establish and maintain satisfactory levels of plant sanitation and hygienic practices that will facilitate the production of clean, safe, and wholesome seafoods. The inexpensive service is being made available on a voluntary, fee-for-service basis, and entails inspection of plants only, unless the processor desires inspection and certification of fishery products as well.

The mode of operation for the "Sanitarily Inspected Fish Establishment Service" involves, first, a request by a seafood company for the expert assistance of a member of the NMFS Fishery Products Inspection and Safety Program to analyze the sanitary conditions in its plant. After the NMFS inspector, working with plant personnel, has conducted a series of sanitation surveys designed to pinpoint the strengths and weaknesses of the facility and processing system under scrutiny, he presents a proposal for the necessary improvements in hygienic conditions and practices, if needed.

Once the weaknesses have been eliminated a brief visit will be made to the plant by an NMFS inspector once or twice a week to maintain the status quo. It is expected that most plants, once approved, will continue the inspection service, primarily to assure the maintenance of high standards of operation.

When all minimum sanitary requirements have been met, the NMFS awards a plaque to the company, attesting to the fact that its plant facilities and operating practices are capable of producing clean and safe fishery products. The name of the processor is then included on a list of commercial seafood producers that are inspected and approved by the Federal Government. The list is published once every three months, with updating and amendments each month, in the NMFS "Guide to Federally Inspected and Approved Fish Establishments and Products." Such listings are widely distributed and recipients include many potential buyers such as schools, cafeterias, restaurants, and food chains.

If a fish processing plant becomes unable to meet the sanitary inspection requirements and is unwilling to correct deficiencies, it will lose Government approval, and it must return the NMFS certificate of approval and lose its place on the approved list appearing in the Federal Guide. Similarly, if an approved plant discontinues the voluntary inspection service, it loses its official status.

Inquiries concerning the new voluntary inspection service may be addressed to the Director, National Marine Fisheries Service, NOAA, Washington, DC 20235.

NOAA Picks Kolf As CZ Coordinator

Richard C. Kolf has been named Coastal Zone Coordinator in the National Oceanic and Atmospheric Administration's Office of Sea Grant.

In this new position, Kolf acts as