

BAITFISH DEVELOPMENTAL ACTIVITIES IN HAWAII
FOR 1975--A PROPOSAL

An expansion of the pole-and-line fishery for skipjack tuna (Katsuwonus pelamis) in Hawaii depends on a total replacement or the supplementing of the present supply of locally available baitfishes. The present supply of nehu (Stolephorus purpureus), the principal baitfish species available in Hawaii, is limited; based on present knowledge a substantial increase in catch on a sustaining basis cannot be expected from this resource. Details of the baitfish problem in Hawaii have been documented elsewhere.

In late 1970 an ad hoc baitfish committee was organized to review and evaluate on-going research on the baitfish problem. The committee is composed of members of the fishing industry (producers and processors in Hawaii), State of Hawaii Fish and Game Division, State of Hawaii Marine Affairs Coordinator, Pacific Island Development Commission/Pacific Tuna Development Foundation, Hawaii Institute of Marine Biology (University of Hawaii), the University of Hawaii Sea Grant Programs and the National Marine Fisheries Service. The committee recently met on April 8 and again on April 24, 1975, to review the status of the baitfish transport project presently conducted by the NMFS Honolulu Laboratory and to discuss future work. At the April 24, 1975 meeting, Mr. Andrew Gerakas as Chairman/President of the PTFD indicated that the Foundation would entertain proposals on baitfish work in Hawaii for financial support.

The following provides details of a proposal to PTFD for support of baitfish work in Hawaii:

SUMMARY

Three recommendations for further baitfish development work emerged from discussions of the ad hoc baitfish committee meetings of April 8 and April 24, 1975. The three projects recommended are:

1. Continue work on transporting northern anchovy (Engraulis mordax) via the roll on/off method. Factorial experiments with northern anchovy in San Francisco Bay need to be initiated in order to assess effects of bait quality, oxygen levels, salinity, and handling methods on survival rates. This is to be followed by a trial roll on/off shipment from Oakland, California.
2. Transport, via a west coast commercial fishing boat, one large shipment (1,500-3,000 scoops) of northern anchovy for use in fishing tests in Hawaii.
3. Provide threadfin shad (Dorosoma petenense) from Wahiawa Reservoir for fishing tests during the 1975 skipjack tuna season.

The committee's recommendation was unanimous that work be started on all three projects as quickly as possible. The majority of the members felt that should priorities be assigned, the first two projects should not be separated and should receive first priority.

Details of the projects follow:

ROLL ON/OFF EXPERIMENTS

For the past year, the National Marine Fisheries Service (NMFS) has been studying the feasibility of transporting anchovy from California via a 5,000-gallon tanker-trailer shipped aboard roll on/off freighters operating out of Long Beach. In six trial shipments, much has been learned of the technology and economics of such an operation. The basic transport unit, the tanker-trailer, has evolved to a highly advanced mobile, life-support system. Dockside experiments with it indicate that it is capable of delivering payloads of up to 1,100 pounds of live bait at reasonable cost. So far, however, the system has been able to deliver payloads of only about half this amount.

A number of unresearched problems appear to contribute to the system's failure to produce the expected results. What is the effect on shipment mortality of interacting factors such as initial bait viability, oxygen levels, density of bait, salinity, handling methods and water quality in holding tanks? Factorial experiments are planned to answer these questions, using as many small tanks (1,000 or more gallons each) as treatments and running successive lots of bait in 4-day experiments, ranking initial viability by both behavioral observations and sample blood cell volumes. The results of these experiments will be used in determining when and under what conditions to ship live bait by this or other methods.

Problems of high mortality in holding bait both in aging tanks and in the tanker-trailer have continually hampered the NMFS operation in the Long Beach-Los Angeles harbor area. Low bait quality (viability) and water quality chronic to the area appear to be prime suspects according to fishery biologists, bait dealers, and live-bait fishermen acquainted with this and other areas of the California coast. This site was chosen because the only two freighters suitable for this type of operation were scheduled between Long Beach and Honolulu. This situation has now changed. One of these freighters, Matson's Lurline, has moved its base to Oakland to operate full time between there and Honolulu. Because of this freight schedule change, the generally superior bait and water quality in San Francisco Bay, and access to research facilities, the experiments will be conducted at NMFS Tiburon Laboratory on San Francisco Bay. The experiments, lasting approximately 3 months, will be followed by a trial shipment of bait out of Oakland.

BUDGET FOR ROLL ON/OFF

	<u>NMFS</u>	<u>Other sources</u>
<u>Salaries</u>		
Consulting statistician	--	\$ 1,000
1 project leader, 10 weeks	\$ 4,947	--
1 technician, 2 weeks	925	--
1 technician, 4 weeks	1,956	--
Overtime and night differential	<u>931</u>	<u>--</u>
	8,759	1,000
<u>Travel</u>		
Per diem: 7 man-days @ \$30	--	210
GSA car rental (California)	250	--
Miscellaneous travel expenses	--	250
Air fare (2 round trips)	<u>--</u>	<u>600</u>
	250	1,060
<u>Utilities</u>		
Electricity	--	700
Water	--	<u>400</u>
		1,100
<u>Equipment</u>		
Tanks (10 @ \$300)	--	3,000
Pumps (5 @ \$1,084)	--	5,420
Plumbing (\$150 per tank)	--	1,500
Lumber, sand, concrete	--	900
Tank covers (10 @ \$50)	--	500
Oxygen meter	--	<u>865</u>
		12,185
<u>Operational expenses</u>		
Fish food	--	100
Live fish	--	10,000
Chemicals	--	1,200
Truck rental	--	<u>200</u>
		11,500

	<u>NMFS</u>	<u>Other sources</u>
<u>Trial shipment</u>		
Fare: tanker and attendant, trucking	\$ 1,675	--
<u>Miscellaneous and contingency fund</u>	_____	<u>\$ 3,000</u>
	\$10,684	\$29,845

BAIT BOAT TRANSPORT

The question of the effectiveness of northern anchovy relative to nehu in catching skipjack tuna is crucial to the feasibility of all bait transporting schemes under consideration. For example, in the economic study of transporting bait via tanker-trailer on roll on/off freighter, the results are so sensitive to slight changes in the ratio of anchovy to nehu effectiveness as to overshadow all known variables in the outcome. Small payloads of anchovies transported to Hawaii in the past have been insufficient to give significant results concerning their relative fishing power.

The only feasible method presently available to transport sufficient quantities for a fishing test is the use of a west coast bait boat as a transporter. These vessels are already equipped to carry from 1,000 to 3,000 scoops of live bait on extended trips. With a delivery in this size range, fishing tests involving the entire Hawaiian skipjack tuna fleet could be conducted for up to 1-1/2 months. NMFS can supply labor for observations at sea and data processing. Limited fishholding facilities can be available if NMFS is not, at the same time, engaged in threadfin shad experiments. Otherwise, the transporting boat can be used to store the bait until used.

In addition to supplying bait for fishing tests, the venture would supply more data on operating costs and survival rates that would be useful in evaluating the economic feasibility of using this system as a bait transporting system in its own right.

BUDGET FOR BAIT BOAT TRANSPORT

	<u>NMFS</u>	<u>Other sources</u>
<u>Labor costs</u>		
Project leader, 1-1/2 months	\$ 2,629	--
3 technicians, 1-1/2 months	6,958	--
Overtime, night differential	<u>2,500</u>	--
	12,087	

	<u>NMFS</u>	<u>Other sources</u>
<u>Contract - bait boat</u>		
Estimate of negotiated contract based on costs of operating 100 ft. west coast tuna boat ¹	--	\$25,000
<u>Operational expenses</u>		
Bait boat for bait storage in Honolulu, if needed (30 days @ \$200)	--	6,000
<u>Miscellaneous and contingency fund</u>	<u> </u>	<u>3,000</u>
	\$12,087	\$34,000

THREADFIN SHAD - FISHING EXPERIMENTS

Should bait transporting schemes prove infeasible, work should be underway to augment central Pacific supplies of bait in other ways. One of the more likely alternatives is the use of threadfin shad. These fish, an introduced euryhaline species, maintain a high standing population in Wahiawa Reservoir, Oahu, and the resource may be capable of producing a sustainable yield sufficient to supply much of the bait needs of the local skipjack tuna fleet. Threadfin shad possess most of the desirable attributes of ideal tuna baitfish and are amenable to culture in freshwater ponds. They can be acclimated to salt water before transfer to baitwells aboard fishing vessels.

Some short fishing trials have been conducted with threadfin shad in past years, enough to show that they can produce good results in catching skipjack tuna, but not sufficient to develop optimum fishing methods, nor to gain fisherman acceptance of the new bait. In switching to any alternate bait, new methods of use must be evolved to utilize their unique behavioral and appearance aspects. This cannot be done with small quantities of bait in short time periods.

The proposed work will extend through the peak fishing season, about 3 months, supplying threadfin shad from Wahiawa Reservoir and acclimating them at a rate of approximately 100 buckets per week. The fishing tests can involve the entire skipjack tuna bait boat fleet with bait apportioned on a random selection basis to those vessels that wish to participate. NMFS facilities to be used in the project include the

¹Green, Roger E., and Gordon C. Broadhead. 1965. Costs and earnings of tropical tuna vessels based in California. Fish. Ind. Res. 3(1):29-45.

tanker-trailer designed for highway hauling of bait; holding and acclimatizing facilities and much of the labor used in catching the threadfin shad, sending observers on fishing trips, or to conduct dockside interviews, data processing, etc.

BUDGET FOR SHAD EXPERIMENTS

	<u>NMFS</u>	<u>Other sources</u>
<u>Labor costs</u>		
Project leader, 4 months	\$ 5,160	--
Driver for tanker-trailer	1,032	--
7 laborers, 4 months	9,800	\$ 9,800
Diving pay (64 man-days)	800	--
Overtime	<u>3,000</u>	<u>--</u>
	19,792	9,800
<u>Utilities</u>		
Fresh water	--	<u>4,000</u>
<u>Equipment</u>		
Boat trailer, lumber, airstones, anchors, plumbing, bait skiffs, diving gear, tires	--	<u>1,580</u>
<u>Operational expenses</u>		
Oxygen, gasoline, fish food, diving air, repair and maintenance	--	<u>2,576</u>
<u>Miscellaneous and contingency fund</u>	<u>--</u>	<u>2,000</u>
TOTAL	\$19,792	\$19,956

TOTAL BUDGET SUMMARY

	<u>NMFS</u>	<u>Other sources</u>
<u>Project</u>		
Roll on/off	\$10,684	\$29,845
Bait boat transport	12,087	34,000
Threadfin shad	<u>19,792</u>	<u>19,956</u>
	\$42,563	\$83,801

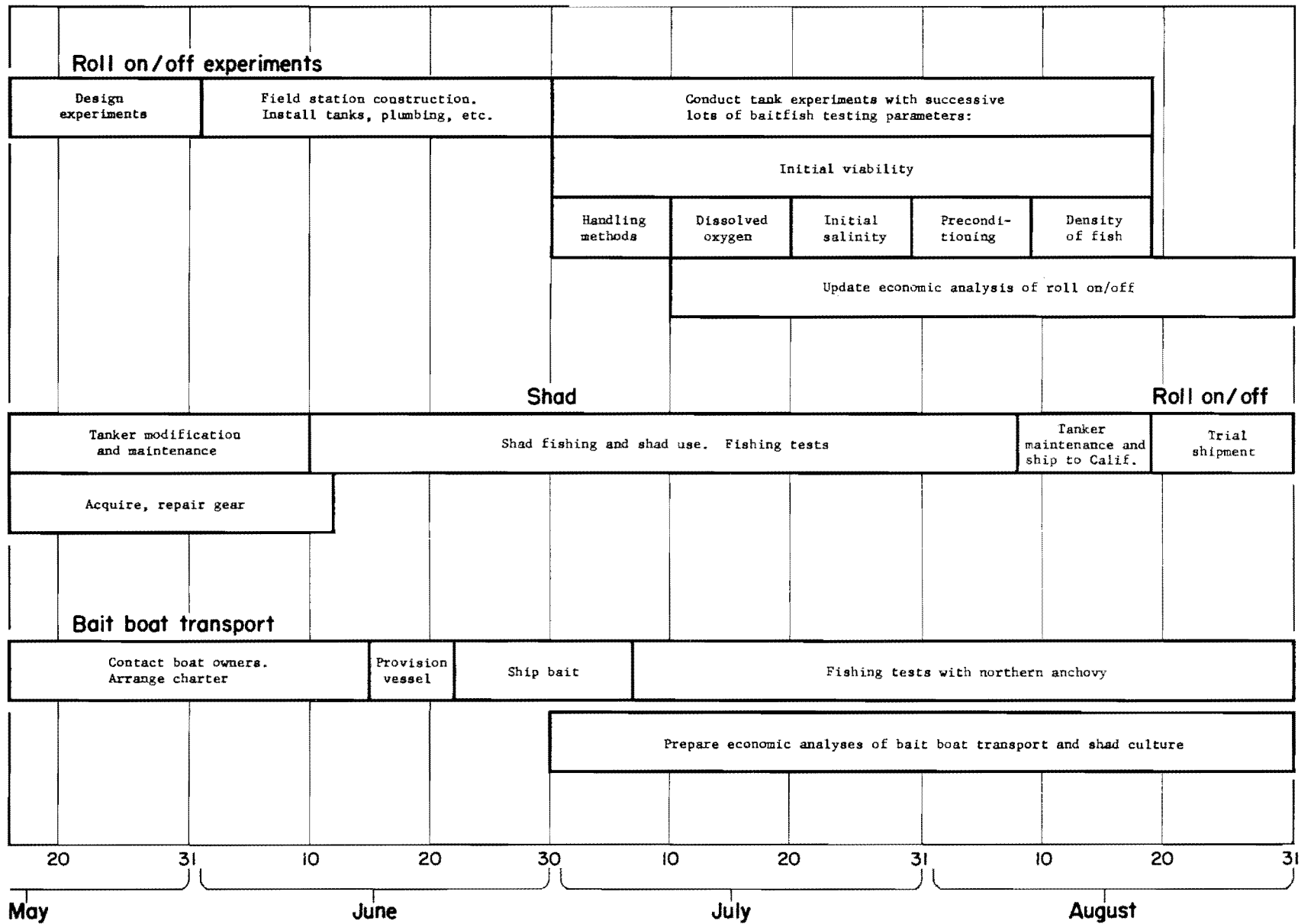
MEMBERS OF AD HOC BAITFISH COMMITTEE

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J. Davidson (Sea Grant Programs, UH)
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R. Kinney (Tuna Boat Owners Association)
J. Puffinburger (Hawaiian Tuna Packers)
R. Shomura (NMFS, Honolulu)
M. Takata (Division of Fish and Game, Hawaii State)

Attachment

May 15, 1975

FLOW CHART OF BAITFISH DEVELOPMENTAL ACTIVITIES IN HAWAII FOR 1975



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