Estimates of the Amount of Nehu, *Stolephorus purpureus*, Per Bucket of Bait in the Hawaiian Fishery for Skipjack Tuna, *Katsuwonus pelamis*

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ABSTRACT

A sample survey in the Hawaiian pole-and-line fishery for skipjack tuna, *Katsuwonus pelamis*, showed that the average bucket of nehu, *Stolephorus purpureus*, the principal baitfish used in the fishery, weighs 6.4 kg (14.2 lb). This is greater than prior estimates for buckets of nehu (3.2 or 3.6 kg, 7 or 8 lb). It is not known whether the difference is due primarily to changes in bait handling practices or to inaccuracies in the early sampling and estimation procedures.

INTRODUCTION

Throughout the Pacific in the pole-and-line fisheries for skipjack tuna, *Katsuwonus pelamis*, the amount of bait taken aboard and subsequently used in fishing is customarily measured in units of "scoops" or "buckets." However, because bait handling practices differ among fisheries, and even among vessels in the same fishery, the average weight of bait per bucket or scoop varies widely. In the eastern Pacific a scoop of northern anchovy, *Engraulis mordax*, averages 3.6 kg (8 lb), while in Japan the average bucket of *E. japonica* varies from 3.4 kg (7.5 lb) to 7 kg (15.4 lb), depending on the area where observations are taken (Yoshida et al. 1977). Palauan skipjack tuna fishermen convey the local anchovy, *Stolephorus heterolobus*, in relatively small buckets with a high proportion of water, so an average bucket of bait in that fishery contains only 2 kg (4.4 lb) of fish (Muller 1977). In the Hawaiian pole-and-line fishery, the figure used historically for buckets of nehu, *S. purpureus*, is 3.2 or 3.6 kg (7 or 8 lb).

While many analyses within a particular fishery can be based on the amount of bait caught in terms of scoops or buckets, comparisons between fisheries require that the bait statistics be reduced to common units. Even within fisheries it is often necessary to know the actual weight of bait used. For example, this is critical in the evaluation of bait substitution schemes (Wetherall 1977).

We present results of a sampling program conducted in 1974-75 in the Hawaiian pole-and-line fishery with the objective of estimating the average weight of a bucket of nehu.

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PROCEDURE

Observers sampled buckets of bait aboard cooperating skipjack tuna vessels during normal baiting operations. Buckets were sampled randomly. The baiting crews did not know which buckets were to be sampled until the baitfish were in the buckets and ready to be placed into the baitwells. Thus no bias was introduced by fishermen when loading the buckets. Two buckets were to be sampled from each of two sets on the designated baiting trips. Sampled baitfish were poured into a dip net and allowed to drain before being weighed with a spring scale to the nearest 0.1 kg (0.25 lb). Each sample was taken to the laboratory where the number of fish in a 0.5-kg (1-lb) sample was counted. Standard lengths of 50 specimens from each sampled bucket were measured. The stainless steel buckets on each vessel were measured and their volumes were calculated.

RESULTS

Although the response of vessel captains was good, scarcity of baitfish, rough seas, and drydocking of some vessels hampered the sampling, so only 13 samples were collected from five vessels. Results are given in Table 1.

The weight of nehu in the sampled buckets ranged from 3.2 to 10.4 kg (7.0 to 23.0 lb), averaging 6.4 kg (14.2 lb). The number of nehu per pound varied from 504 to 956 (averaging 725) and the estimated number of nehu per bucket ranged from 5,670 to 20,769 (averaging 10,414). The volume of the buckets used by the five vessels varied from 23.1 to 25.4 liters, averaging 23.5 liters (6.1 to 6.7 gal, averaging 6.2 gal).

Nehu are customarily bucketed directly from the bunt of the bait seine into baitwells, but since the mid-1960's a few vessels such as the *Anela*, the *Buccaneer*, and the *Lehua* have used a different procedure—nehu are dip

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Table 1.—The results of sampling buckets of nehu from five Hawaiian skipjack tuna fishing vessels.

Vessel	Date sampled	Bucket size (liters)	Set no.	Sample no.	Weight of nehu per bucket (kg)	Number of nehu per kilogram	Estimated number of nehu per bucket	Size range (standard length, centimeters)
Anela	2/21/74	23.1	1	1	5.21	1,235	6,434	3.1-5.3, mostly
			1	2	7.02	1,217	8,543	between 4.0 and 4.6
			2	1	5.10	1,147	5,850	
			2	2	5.10	1,111	5,666	
Kilohana	5/30/74	23.1	2	1	3.17	2,108	6,682	3.1-4.6, mostly
			2	2	4.76	2,000	9,520	between 3.3 and 4.0
			2	3	7.13	2,022	14,417	
Lehua	2/14/74	23.8	1	1	6.00	1,312	7,872	3.1-4.9, mostly
			1	2	7.36	1,435	10,562	between 3.9 and 4.3
Buccaneer	5/ 1/75	23.1	1	1	8.38	1,451	12,159	3.9-5.4, mostly
			1	2	6.57	1,865	12,253	between 3.0 and 4.7
Marlin	5/ 6/75	25.4	1	1	7.70	1,885	14,514	2.7-5.3, mostly
			1	2	10.42	1,991	20,746	between 3.2 and 4.6

netted from the bunt of the seine into buckets and then loaded into the baitwells. Our feeling is that the latter procedure results in less variability in the weight of nehu per bucket.

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