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A System for Classifying Small Boat Fishermen in Hawaii

MARCIA HAMILTON
Joint Institute for Marine and Atmospheric Research

A statewide economic survey of Hawaii's fishing vessel operators was conducted in 1995–96. Survey topics fell into five groups: vessel characteristics, owners' motivations, fishing operations, cost and revenue information, and operator demographics. Although this project was designed for and emphasizes the costs and earnings of commercial pelagic fishermen, information was also collected from recreational and nonpelagic fishermen due to the difficulty of eliminating this category prior to the administration of the survey.

Considerable confusion exists as to the definition of the term "commercial fisherman" in Hawaii. According to Hawaii state law, any fisherman who sells at least one fish in a year is considered a commercial fisherman and must obtain a commercial marine license for that year.[1] However, fishermen and other industry members generally consider a commercial fisherman to be one who depends on profits derived from fishing for at least a portion of his income. This definition would exclude a large number of Hawaii's fishermen who sell fish in an attempt to cover their fishing costs but never realize, or expect to realize, an economic profit from their operations.

This group exists due to a mix of easy access to markets and the lack of bag limits for most species. This combination also means that many otherwise "recreational" fishermen who find a good fishing spot will continue fishing past the point of supplying enough fish to meet their family's needs. They know that they can easily sell any excess. Again, Hawaii state law considers this group to be commercial fishermen. However, most industry members recognize the difference between a fisherman who sells his catch to make a living and one who sells to cover a portion of his expenses. Thus, vessels covered in this survey were screened and classified into three types of operations based on operator responses to the following questions:

"What do you do with the fish that you catch?"

If no sales of fish were completed in the previous twelve months, surveys from this group were coded as *recreational vessels*. If any fish were sold in the previ-

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Marcia Hamilton is a research assistant at the Joint Institute for Marine and Atmospheric Research, Honolulu, HI 96822, USA, e-mail: Marcia.Hamilton@noaa.gov.

[1] Monthly catch reports and a commercial marine license are required of all Hawaii's fishermen who sell any portion of their catch. The license is valid for twelve months and costs $25.00. There are no licensing or reporting requirements for recreational fishermen in Hawaii; *i.e.*, those who don't sell their catch throughout the year.

5

ous twelve months, an additional question was asked to further ascertain fishermen's motivations:

> *"When you sell your fish, do you consider yourself a commercial fisherman trying to make some income, or do you sell only to cover your trip costs?"*

Participants appeared to have no difficulty in understanding or answering this question. Those who responded that they sold fish only to cover trip costs were coded as *expense vessels*. Note that covering expenses was the motivation for selling fish, not necessarily the motivation for fishing. If sales were made to create income and/or participants considered themselves to be commercial fishermen, a final question was asked to determine their level of dependence on profits from their fishing operations:

> *"After expenses, what percent of your personal income in the previous twelve months came from fishing?"*

Surveys from fishermen who received 50% or less of their personal income from fishing profits were coded as belonging to the category *part-time vessels*. Respondents who received more than 50% of their income from fishing were coded as belonging to the group *full-time vessels*.

Vessels were further stratified into two groups based on predominant gear types. If the majority (>50%) of trips in the previous twelve months targeted pelagic species, the vessel was coded as a "pelagic vessel." Similarly, if the majority of trips targeted nonpelagic species, the vessel was coded as a "nonpelagic vessel." Vessels for which 50% of the trips targeted pelagic species and 50% nonpelagic species were coded as "dual-gear vessels."

Pelagic species are defined as tunas (*Thunnus* spp. and *Katsuwonus pelamis*), mahi mahi (*Coryphaena* spp.), ono (*Acanthocybium solandri*), and billfish (*Xiphias gladius*, *Makaira*, and *Tetrapterus* spp.). Nonpelagics are all other species. Of 569 completed surveys, 382 were classified as belonging to pelagic vessels, 172 nonpelagic vessels, and 15 dual-gear vessels. The remainder of this work refers only to the pelagic vessels. Although valuable to local (state) fishery managers, analysis of nonpelagic fishing was not the objective of this project.[2]

A major concern, and the focus of this paper, was whether the motivation and classification system is a good one; *i.e.*, were the differences observed between the four groups of fishermen clear and significant, or were there overlaps between some or all groups? To answer this question, means testing was conducted on eleven variables using the SAS procedure LSMEANS to test for statistically significant differences between vessel groups. Table 1 presents the results of these analyses, with each vessel group designated by a letter (A–D). The sharing of their letters within a cell indicates groups for which means were not found to be significantly different. Groups with means significantly different ($p < 0.05$) from all other groups are indicated by the presence of their group letter alone within a cell.

Significant differences were found between all groups for six of the variables examined. As expected, avidity, catch, catch rates, percent of catch sold, annual gross fishing revenue, and percent of income from fishing profits were

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[2] Twelve pelagic vessels that took trips of more than one day (24 hours) were also dropped from this subset, as their operations were not directly comparable to the majority that took only one-day trips.

Table 1
Results of Means Tests Between Vessel Groups

Variable	Vessel Group			
	Recreational	Expense	Part-time	Full-time
Total annual fishing trips	A	B	C	D
Total annual catch	A	B	C	D
Catch per trip	A	B	C	D
Percent of annual catch sold	A	B	C	D
Annual gross fishing revenue	A	B	C	D
Percent of income from fishing profits	A	B	C	D
Total investment	A	B	CD	DC
Annual fixed costs	A	B	CD	DC
Average price per pound received	n/a	BCD	CBD	DBC
Annual household income	A	BC	CBD	DC
Operator's age	ABC	BA	CA	D

lowest for recreational fishermen, with increasing values for expense fishermen, part-time and full-time fishermen, respectively. Mean values of the remaining five variables were generally more similar among part-time and full-time fishermen than they were among recreational and expense fishermen. Total investment and fixed costs were again lowest for recreational fishermen, higher for expense fishermen, and highest for part-time and full-time fishermen.

Interestingly, the average price per pound received was not significantly different among all groups that sold fish. This implies that all groups have access to fish of similar quality and to similar markets, and that part- or full-time small boat pelagic fishermen have no quality or market advantages in Hawaii.

Annual household income and operator age also overlapped between groups; however, in contrast to the above, mean values of these two variables were highest for recreational fishermen, lower for expense fishermen, and lowest for full-time fishermen.

Based on the above results, the classification system was useful. Screening criteria were meaningful to survey participants, and analysis of the data collected indicates that there were many significant differences between groups. These results are important to fishery managers in Hawaii, as they provide both a structure and a baseline for assessing the potential and actual impacts of any new regulations. Hawaii's current system, which defines a commercial fisherman as any fishermen who sells one fish, provides only a broad picture of this group and their motivations. This study allows further insight into the human elements of Hawaii's small boat pelagic fishery and may help us to devise more effective fishery management systems.