

MARINE RECREATIONAL INFORMATION PROGRAM

PROJECT REPORT

Hawaii for-hire pilot study to incorporate validation procedures in the commercial marine license reporting program (MRIP For-Hire Project)

by

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1. Executive Summary

The goal of this project, funded by the Marine Recreational Information Program (MRIP) in 2009 and 2010, was to document the Hawaii for-hire sector's level of compliance with the Hawaii Division of Aquatic Resources (HDAR) reporting system and to identify possible changes to improve the system. State regulations require charter boat operators to report on every fishing trip through Commercial Marine License (CML) monthly reports. According to the annual pelagic report by the Western Pacific Regional Fishery Management Council (2006), the estimated number of trips and catch from charter fishing vessels in Hawaii accounted for more than 80% of the charter amount in the Western Pacific region in 2005.

In 2009, dockside surveys were conducted at four major charter-boat harbors in the state of Hawaii, one on each of the most-populated Hawaiian Islands. Charter boat trips from the four chosen harbors accounted for more than 70% of the total charter boat trips in the state based on the 2007 CML reports. Surveyors observed charter vessels exiting and entering each of these harbors on 30 consecutive days (in one month) to measure effort levels by charter vessels. These on-the-ground counts were compared to effort levels reported by charter vessel operators in the CML reports for the same time periods. Field data were first collected in November of 2009. However, the most active months for charter fishing are in the summer for Honokohau Harbor in Kona, Hawaii, the most well-known charter boat harbor in the state. Due to this seasonal variation, charter fishing activity was monitored again at Honokohau Harbor in March and July of 2010, and at a Maui charter boat harbor in July 2010, to detect any differences in reporting levels across seasons.

The survey at all four harbors in November 2009 indicated that the trip report rate to HDAR averaged 64% for boats on the CML charter list, varying from 50% to 70% across harbors. In addition to underreporting, "no reporting" contributed to the low report rate; 10% of the observed trips were taken by licensed boats which submitted DNF (Did Not Fish) reports or did not submit fishing reports. There also were many likely charter trips from boats that were not on the CML charter list, especially at the two most active harbors. Including these likely charter trips, the reported trips only accounted for fewer than half (48%) of the observed trips in November 2009. At the two harbors where fishing was also monitored in March and July 2010, there were more fishing trips than in November (mainly due to increased trips taken by each boat). However, the report rates for fishing trips were similar across seasons within a harbor.

The catch for billfish (including blue marlin, striped marlin, and short bill spearfish) reported in the 2009 CML fishing reports at the largest charter harbor was compared with charter desk catch reports; the CML rates were 61-68% for kept catch and 76-89% for released billfish. The report rate for billfish catch was comparable to the report rate for trips at the harbor.

The estimated trip report rate for boats on the CML charter list could be improved with the current reporting system to adequately capture the charter fisheries in Hawaii. The following changes could help reduce non-reporting and under-reporting:

- 1) Owners and major captains of some charter corporations may own and operate multiple boats, but they may only put one boat name (or name combination) in the CML application and renewal and may often submit CML reports only for one boat name (or name combination). Charter fishermen should be advised to submit separate fishing reports for different boats used for charters. Another option would be for HDAR to modify the fishing report form to accommodate reporting of multiple boats in one report. Boat name combinations or using one boat name for multiple boats should be avoided in the reports, especially when there is more than one boat under the same name or name combination fishing on the same days. The CML application and renewal could be modified so that multiple vessel names can be included in one form.
- 2) The operators who are on the vessels could be responsible for reporting the charter trips rather than the corporation owners or captains who are not on the vessel. When one fisherman reports for boats that he is not on physically, the fisherman may neglect trips without catch and underreport the trips. Although some are not owners, charter operators without a CML should get their own license and report their trips when the owners/major captains are not on board.
- 3) A major “outreach and education” project should be conducted with the charter industry to ensure that they fully understand reporting requirements and submit more complete and accurate reports to HDAR. Charter fishermen should be informed that accurate reporting for all trips is as important as catch reporting because of the economic impacts of all trips (including trips without catch) and because of the need for accurately estimating catch rate. More robust data quality checks and feedback mechanisms could be developed and implemented within the HDAR data processing system.

2. Introduction/Background

Recreational fishing in Hawaii is monitored through the Hawaii Marine Recreational Fishing Survey (HMRFS), a collaborative program between NMFS (National Marine Fisheries Services) and the Hawaii Division of Aquatic Resources (HDAR). HMRFS is part of the NMFS Marine Recreational Fisheries Statistical Survey (MRFSS). MRFSS has conducted recreational fishing surveys in the continental United States since 1979. MRFSS started in Hawaii in 1979 and lasted for only two years partially due to funding and staffing restrictions and HMRFS was reinstated in 2001. The MRFSS contains three components: 1) coastal household telephone surveys (CHTS) for information on shore and private/rental boat fishing efforts; 2) access point angler intercept survey (APAIS) for catch data from shore, private/rental boat, and for-hire (mostly charter boat in Hawaii) anglers; and 3) for-hire survey (FHS) for effort data from

charter boat captains about trips taken for hire. Currently, HMRFS does not include surveys of the for-hire sector. Allen and Bartlett (2008) presented the HMRFS procedures and used data from 2003 as an example to demonstrate how catch estimates are developed.

The for-hire survey in Hawaii began in the middle of 2003. Estimates for for-hire were not generated due to low participation for field intercept surveys (for charter boats) in some areas (especially on Oahu) and low response rate for the FHS telephone surveys. After several years of struggling with the for-hire sector to collect adequate data, the for-hire component was dropped from HMRFS in January 2007. Fishermen in Hawaii taking marine species for commercial purposes are required by the State of Hawaii to have a Commercial Marine License (CML) and submit monthly reports to HDAR including the charter boat “for-hire” sector. In theory, there is a census logbook system in effect for charter boats in Hawaii and currently the estimates of effort (trips) and catch of for-hire fishing are based on monthly CML reports. However, there are known shortcomings with the current CML monthly reporting program for the charter boat sector. For example, from examining safety equipment, the US Coast Guard found that significant numbers of for-hire vessels were unlicensed in Hawaii, and/or were not reporting to HDAR. For licensed charter operators, they may have inaccurately reported trips and catch due to recall errors associated with monthly rather than more frequent (e.g. weekly) reporting.

As members of For-Hire Work Group under NMFS Marine Recreational Information Program (MRIP), we submitted a proposal to MRIP in January 2009. The goal of the proposed project was to identify and document gaps, such as the magnitude of non-reporting and under-reporting in Hawaii for-hire sector reporting system, as well as to provide recommendations for improvements. This project continued in 2010, trying to compare underreporting/non-reporting in different seasons. Due to logistical constraints, the 2009 survey was conducted in November. Based on the CML reports, the most active months are in the summer at the largest charter boat harbor in Hawaii. In 2010, the fishing activity was surveyed again in March and July at that harbor. For comparison, the fishing activity was also monitored in July 2010 at a harbor in Maui where seasonality was not clear according to the CML data. This report includes the results from two years (2009 and 2010).

3. Methods

The boat activity survey form (Appendix 1) was developed prior to a pilot survey at two Maui harbors in August 2009 to test and refine survey methodology and instruments. This form was used by field surveyors to record a census record of all charter boats departing from or returning to the port being surveyed. The results of this documented and verified trip activity were compared to other sources of data such as the HDAR CML reports and Hawaii Fishing News records. For the pilot survey, surveyors observed the boat activity from 6:00 AM to 17:00 PM at Lahaina Harbor for one week and at Maalaea Harbor for another week. Maalaea Harbor has much more wind, causing few boats to go out in the afternoon, or out for a second trip. Lahaina Harbor is the most

known charter fishing harbor on Maui with a fueling dock inside the harbor and transportation vessels that ferry people to Lanai or to other boats. The results from these test surveys helped determine the best survey times for the upcoming major surveys in November 2009 and 2010.

The major part of the survey was conducted in November 2009 for 30 days consecutively at four major charter harbors including Honokohau Harbor (Hawaii, Big Island), Lahaina Harbor (Maui), Nawiliwili Harbor (Kauai), and Kewalo Basin Harbor (Oahu). The survey was conducted at the harbors every day from 8:00 AM to 17:00 PM. Similar to the pilot survey, the surveyors observed and recorded the fishing boat activities. Captains, crews, and patrons (on charter boats) were not interviewed for the survey so that CML monthly reporting by captains would not be impacted. In March and July 2010, the survey was conducted again at Honokohau Harbor where the CML reports indicated strong seasonality in fishing activities. In July 2010, the fishing activity was also monitored at Lahaina Harbor where there was no strong seasonality based on CML reports. Daily trips observed from individual boats in surveys were compared with those from the CML monthly reports. In Hawaii, charter fishermen are required to report all fishing trips whether chartered or not. Since fishermen were not interviewed, the trips taken by charter boats did not confirm whether it was a charter trip or not. For comparison, all fishing trips by charter boats in CML monthly reports were included (chartered and not chartered) to compare with observed fishing trips in the survey from those vessels.

For the entire year of 2009, the catch for billfish (blue marlin, striped marlin, and shortbill spearfish) from the charter desk in Honokohau was compared with catch from the HDAR 2009 CML reports. The charter desk operates the weigh scales at the fuel dock in Honokohau Marina. The catch report is published at its website (<http://www.charterdesk.com>) and in Hawaii Fishing News. The catch report for more than 60 boats covers all billfish caught /released and for tuna larger than 100 lbs. Catch recorded at the charter desk may include catch from non-chartered trips taken by charter boats. For the boat-based comparison with reports from the charter desk, catch and release from the CML reports included these from chartered trips and non-chartered trips.

The historic HMRFS data for charter vessels (2003-2006) were compiled and compared with CML catch data for these years. Harbors with relatively complete survey data (for each two month period of a year) were selected and the catch rates (# of fish per angler trip) at these sites were compared with the rates (number of fish per boat trip) from CML reports. Since the effort estimates from the charter survey were not available, catch rate rather than catch amount was compared. The effort unit from CML is boat trips and the unit from the charter survey was angler trips. Thus, the correlations between the two rate estimates and the ratios between these two rates were analyzed.

4. Results

The study focused on the comparisons between the fishing activities observed by surveyors and the fishing trips reported by charter fishermen at Honokohau Harbor in Hawaii (Big Island), Lahaina Harbor (Maui), Nawiliwili Harbor (Kauai), and Kewalo Basin Harbor (Oahu). Catch data from other sources (a charter desk and previous survey) were used to compare with total catch and catch rate in the fishermen reports.

(a) Maui pilot surveys

Test surveys were carried out in August 2009 at two harbors in Maui. Charter fishing is very active at these two harbors. At Maalaea harbor, 23 charter trips from six boats were observed on August 23-30 (see Table 1a in Appendix 2). The surveyors were able to observe both departure and return times for 21 (out of 23) trips during the survey time from 6:00 to 16:00. At Lahaina Harbor, more than 70 charter trips were recorded from 18 boats on August 16-22. About half of the trip records were missing either departing time or return time, suggesting that these boats departed earlier than 6:00 AM (the survey start time) or returned later than the time when the surveyor left. From these results, we decided to start at 8:00 AM for the major surveys (for 30 consecutive days in November). The shortened survey duration (8:00 AM to 5:00 PM) was more practical and had the ability to record at least one end (departing or return) of all the trips observed in test surveys.

(b) Activity surveys in Hawaii (Big Island)

Three surveys were conducted at Honokohau Harbor, in November 2009, in March and July 2010. In November 2009, 46 charter vessels were shown in CML reports for fishing trips (including charter and non-charter trips, boats A1-W2 in Table 1). All trips from each of the 46 boats were reported by one fisherman only for the month. There were 46 fishermen associated with these 46 boats and one fisherman reported for one boat only in November 2009. Six of them had charter trips in CML reports, but they were not indicated in the current CML applications and renewals as charter boats by fishermen. Four charter vessels (NS1-NS4, Table 1) registered (current in November 2009) by fishermen as intended for chart fishing were not in fishing reports including the DNF (Did Not Fish) reports, but surveyors observed fishing trips by them. Nine registered fishermen (eight of them were captains) with charter boats filed the DNF reports. Trips from five of these boats (DNF1, DNF3-4, DNF6, Table 1) were observed in the field, but these boats were not shown in the CML reports for any fishing trips. In this project report, the terms “registered charter vessels/boats”, “registered vessels/boats”, and “boats indicated in fishermen’s CML applications/renewals as intended for charter fishing” are used interchangeably. Eight of the 46 vessels that reported trips showed that the daily fishing trips were at least twice as many as those reported in CML (including both chartered and non-chartered trips by the registered boats). The total fishing days in CML were 251 (47 non-chartered) and the observed fishing days were 329. For some vessels (such as F1 and K2), the fishing days in CML were larger than the days observed in the field due to possible lapses in the survey or inexact reporting in CML reports. The observed fishing days were adjusted for these vessels so that the maximum report rates (days in CML / adjusted days) for individual vessels are 1 (Table 1).

Table 1. Honokohau Harbor (Hawaii), November 2009, survey results for number of fishing days reported in CML monthly report (Days in CML) versus observed fishing trips (Observed trips), fishing days (Observed days fished), and adjusted fishing days (Adjusted days fished). Adjusted days are mostly equal to fishing days observed (Days fished) and are only replaced with days in CML when days in CML > fishing days observed. DNF boats (DNF1-8) submitted DNF reports. NS boats (NS1-4) are the boats with no reports submitted.

Boat	Days in CML	Observed trips	Observed days fished	Adjusted days fished	Report rate
A1	1	3	3	3	0.333
A2	1	4	4	4	0.250
A3	6	7	7	7	0.857
A4	7	7	7	7	1.000
B1	57	61	52	57	1.000
B2	1	1	1	1	1.000
B3	1	1	1	1	1.000
C1	5	11	11	11	0.455
C2	2	2	2	2	1.000
F1	7	5	5	7	1.000
G1	1	1	1	1	1.000
H1	3	2	2	3	1.000
H2	10	15	14	14	0.714
H3	5	3	3	5	1.000
H4	7	14	13	13	0.538
H5	2	2	2	2	1.000
H6	6	9	9	9	0.667
H7	3	2	2	3	1.000
H8	2	3	3	3	0.667
H9	4	4	4	4	1.000
I1	4	4	4	4	1.000
K1	3	2	2	3	1.000
K2	3			3	1.000
K3	4	7	7	7	0.571
L1	2	2	2	2	1.000
L2	2	7	6	6	0.333
L3	2	4	4	4	0.500
L4	2	2	2	2	1.000
M1	17	15	15	17	1.000
M2	3	11	10	10	0.300
M3	8	11	11	11	0.727
M4	3			3	1.000
N1	6	5	5	6	1.000
N2	2	6	6	6	0.333
P1	2	2	2	2	1.000
P2	2	2	2	2	1.000
R1	3	3	3	3	1.000

S1	2	2	2	2	1.000
S2	7	11	11	11	0.636
S3	5	5	5	5	1.000
S4	8	9	9	9	0.889
S5	2			2	1.000
T1	1	3	3	3	0.333
T2	10	8	8	10	1.000
W1	9	12	12	12	0.750
W2	8	2	2	8	1.000
NS1		0	0	0	
NS2		11	11	11	
NS3		12	12	12	
NS4		7	7	7	
DNF1	0	4	4	4	0
DNF2	0	0	0	0	
DNF3	0	1	1	1	0
DNF4	0	13	13	13	0
DNF5	0	0	0	0	
DNF6	0	2	2	2	0
DNF7	0	0	0	0	
DNF8	0	0	0	0	
Sum	251	342	329	360	

Seven boats were observed to take a second trip in a day once in November 2009. One boat took a second trip twice and two boats took a second trip four times each in November. For a boat name with three boats (I, II, and III), trips from different boats on the same day were reported separately with different fishing hours in CML. However, second trips (on the same day) from any individual boats in the series were combined with the first trip. Second trips in other boats were also combined with the first trips in CML. In Table 1, the comparison (report rate) for trips from CML and survey were based on fishing days.

There were 27 vessels (not in Table 1) that could be charter boats based on the list of boats that reported charter trips in recent years and based on the charter boat list at the Hawaii Fishing News website. These boats could not be identified as active charter boats in the CML system as of November 2009 (i.e. there were no CML reports for charter trips from these boats in November and these boats were not listed as charter boats by current fishermen in November). Eight of these boats reported charter trips in other months in 2009 and no fishing trips (chartered or not) were reported in November for these eight boats. For the rest of the boats (these vessels are on the charter boat list at the Hawaii Fishing News website or reported charter trips in the previous two years) that didn't report any charter trips in 2009, only two vessels reported in CML monthly reports for non-chartered trips in November and in 2009. Generally speaking, local private and commercial fishing vessels that are not charter boats typically have fewer than four people on board. Only trips with ≥ 4 people on board were counted as potential charter trips from these 27 vessels and there were ~130 potential charter trips in November 2009.

In March 2010, 54 charter vessels were shown in the CML reports with fishing trips (boats A1-W2, Table 2). Two vessels (F4 and N1) reported fishing trips at different ports than Honokohau Harbor. For 17 of these vessels, the fishing days were at least twice as many as those reported in CML. Six charter boats (NS1-6) did not submit the reports, but fishing trips were observed from four of them. Nine boats submitted DNF reports to HDAR whereas the field survey observed fishing trips for five of these vessels. There were 28 other vessels (not in Table 2) that could be charter boats and they had 214 fishing days when there were ≥ 4 people on board.

Table 2. Honokohau Harbor, March 2000, survey results for number of fishing days reported in CML monthly report (Days in CML) versus observed fishing trips (Observed trips), fishing days (Observed days fished), and adjusted fishing days (Adjusted days fished). Adjusted days are mostly equal to fishing days observed (Observed days fished) and are only replaced with days in CML when days in CML > fishing days observed.

Boat	Days in CML	Observed trips	Observed days fished	Adjusted days fished	Report rate
A1	6	8	8	8	0.750
A2	18	19	19	19	0.947
A3	10	14	13	13	0.769
B1	70	120	87	87	0.805
B2	6	10	10	10	0.600
C1	5	12	10	10	0.500
C2	5	22	16	16	0.313
C3	1	5	5	5	0.200
F1	9	10	10	10	0.900
F2	10	8	8	10	1.000
F3	11	9	9	11	1.000
F4		1	1	1	
G1	6	7	7	7	0.857
H1	6	6	6	6	1.000
H2	5	13	12	12	0.417
H3	22	27	21	22	1.000
H4	2	2	2	2	1.000
H5	13	9	9	13	1.000
H6	8	10	10	10	0.800
H7	2	2	2	2	1.000
H8	7	3	3	7	1.000
I1	5	6	6	6	0.833
I2	1	4	3	3	0.333
K1	15	9	8	15	1.000
K2	2	4	4	4	0.500
K3	15	0	0	15	1.000
L1	11	13	13	13	0.846
L2	3	3	3	3	1.000
L3	5	12	10	10	0.500
L4	5	19	18	18	0.278

L5	1	2	2	2	0.500
M1	16	16	16	16	1.000
M2	6	20	19	19	0.316
M3	10	12	12	12	0.833
M4	8	6	6	8	1.000
N1		2	2	2	
N2	9	11	8	9	1.000
N3	8	6	6	8	1.000
N4	10	19	16	16	0.625
P1	2	6	6	6	0.333
P2	3	5	3	3	1.000
P3	2	3	3	3	0.667
R1	7	7	7	7	1.000
R2	4	4	4	4	1.000
S1	2	8	8	8	0.250
S2	2	4	4	4	0.500
S3	4	9	8	8	0.500
S4	2	3	3	3	0.667
S5	6	11	9	9	0.667
T1	5	3	3	5	1.000
T2	12	12	11	12	1.000
U1	4	7	7	7	0.571
W1	5	12	12	12	0.417
W2	9	1	1	9	1.000
NS1		20	17	17	
NS2		8	8	8	
NS3		10	10	10	
NS4		0	0	0	
NS5		15	14	14	
NS6		0	0	0	
DNF1	0	5	5	5	0
DNF2	0	2	2	2	0
DNF3	0	1	1	1	0
DNF4	0	1	1	1	0
DNF5	0	0	0	0	
DNF6	0	0	0	0	
DNF7	0	0	0	0	
DNF8	0	15	13	13	0
DNF9	0	0	0	0	
Sum	421	653	580	631	

In July 2010, 58 charter vessels were shown in the CML reports with fishing trips (Table 3). For 12 of these 58 vessels, the observed fishing days were at least twice as many as those reported in CML. Five charter boats (NS1-5) did not submit their reports, but fishing trips were observed from four of them. Ten boats submitted DNF reports, but fishing trips were observed for eight of these vessels. There were 32 other vessels (not in

Table 3) that could be charter boats and they had 351 fishing days when there were ≥ 4 people on board.

Table 3. Honokohau Harbor (Hawaii), July 2010, survey results for number of fishing days reported in CML monthly report (Days in CML) versus observed fishing trips (Observed trips), fishing days (Observed days fished), and adjusted fishing days (Adjusted days fished). Adjusted days are mostly equal to fishing days observed (Observed days fished) and are only replaced with days in CML when days in CML > fishing days observed.

Boat	Days in CML	Observed trips	Observed days fished	Adjusted days fished	Report rate
A1	18	24	21	21	0.857
A2	15	16	16	16	0.938
B1	62	136	82	82	0.756
B2	16	16	16	16	1.000
C1	6	25	24	24	0.250
C2	11	18	18	18	0.611
C3	9	8	8	9	1.000
F1	25	33	28	28	0.893
F2	14	12	11	14	1.000
F3	20	16	16	20	1.000
G1	7	7	7	7	1.000
H1	4	5	5	5	0.800
H2	5	19	16	16	0.313
H3	16	27	22	22	0.727
H4	3	5	5	5	0.600
H5	10	10	10	10	1.000
H6	15	15	15	15	1.000
I1	4	4	4	4	1.000
I2	8	27	24	24	0.333
K1	21	15	15	21	1.000
K2	12	14	14	14	0.857
K3	4	2	2	4	1.000
K4	14	0	0	14	1.000
K5	9	11	11	11	0.818
K6	4	7	7	7	0.571
L1	6	6	5	6	1.000
L2	6	5	5	6	1.000
L3	0	17	15	15	0.667
L4	8	13	9	9	0.889
L5	5	21	20	20	0.250
L6	19	16	15	19	1.000
M1	11	7	7	11	1.000
M2	10	10	9	10	1.000
M3	9	21	21	21	0.429
M4	24	21	21	24	1.000
M5	27	21	21	27	1.000

N1	11	23	19	19	0.579
N2	12	12	12	12	1.000
N3	14	22	21	21	0.667
P1	10	15	13	13	0.769
P2	6	5	5	6	1.000
P3	7	8	8	8	0.875
P4	6	8	8	8	0.750
R1	4	4	4	4	1.000
R2	1	7	7	7	0.143
R3	4	11	11	11	0.364
S1	2	13	13	13	0.154
S2	6	6	6	6	1.000
S3	12	28	28	28	0.429
S4	7	17	17	17	0.412
S5	7	10	10	10	0.700
S6	12	15	13	13	0.923
S7	2	1	1	2	1.000
T1	2	4	4	4	0.500
T2	22	26	22	22	1.000
U1	3	2	2	3	1.000
W1	4	12	12	12	0.333
W2	8	0	0	8	1.000
NS1		19	19	19	
NS2		0	0	0	
NS3		24	24	24	
NS4		5	5	5	
NS5		1	1	1	
DNF1	0	6	6	6	0
DNF2	0	8	8	8	0
DNF3	0	42	27	27	0
DNF4	0	0	0	0	
DNF5	0	6	6	6	0
DNF6	0	0	0	0	
DNF7	0	3	3	3	0
DNF8	0	3	3	3	0
DNF9	0	1	1	1	0
DNF10	0	1	1	1	0
Sum	629	998	885	946	

The trips reported and observed are summarized in Tables 4 and 5. There were more fishing trips (reported and observed) in March than in November. July was the most active month. For the boats that reported non-zero fishing trips, the report rates were >80% for more than half of the boats. Including trips from boats that did not report or reported DNF, the report rates for all registered boats ranged from 66.5% to 68.9% (last column in Table 4). There were a significant number of other likely charter trips at Honokohau Harbor (Table 5), which would result in lower actual report rates. Many

fishermen did not submit their monthly reports on time, especially in July 2010 (Table 5). In March and July 2010, more boats took multiple trips within a day (Tables 1-3).

The trip counts from the likely charter boats in Table 5 (last column) only included fishing trips with ≥ 4 people on board. Based on HMRFS for-hire survey (2003-2006), the minimum number of patrons was two for charter trips surveyed. On most charter boats in Hawaii, there is one captain and one crew member. Therefore, only trips with ≥ 4 people on board were counted as likely charter trips.

Table 4. Summary for trips for registered charter vessels at Honokohau Harbor including observed trips from boats that didn't submit reports or submitted DNF (Did Not Fish) reports. The adjusted days fished in table are for the boats that reported taking trips. The numbers in the parentheses are number of boats.

Months	Days in CML	Adjusted days fished	Boats with report rate > 80%	Days from no reporting or DNF	Report rate for the harbor
Nov (2009)	251 (46)	310 (46)	30	50 (7)	0.697 (53)
Mar (2010)	421 (54)	560 (54)	29	71 (9)	0.667 (63)
Jul (2010)	629 (58)	842 (58)	34	104 (12)	0.665 (70)

Table 5. Summary of other trip information at Honokohau Harbor including second (or multiple) trips taken within a day and other likely charter trips observed by the surveyors. Late reports are these that were not submitted by the 10th of the following month. The numbers in the parentheses are number of boats.

Harbor	Late reports	Name with multiple boats	Second trips (boats)	Other likely charter trips
Nov (2009)	7	2	14 (7)	132 (27)
Mar (2010)	8	2	73 (22)	214 (28)
Jul (2010)	16	2	113 (22)	351 (32)

The total number of trips from both registered vessels and likely charter vessels increase from winter to summer. Even though the number of fishing boats slightly increased, the larger number of trips in spring and summer was more due to more fishing trips taken by each boat (Figure 1). The observed trips per boat were significantly different among three months (July (Jul) was the highest and November (Nov) was the lowest, Figure 1). The reported trips showed a similar pattern.

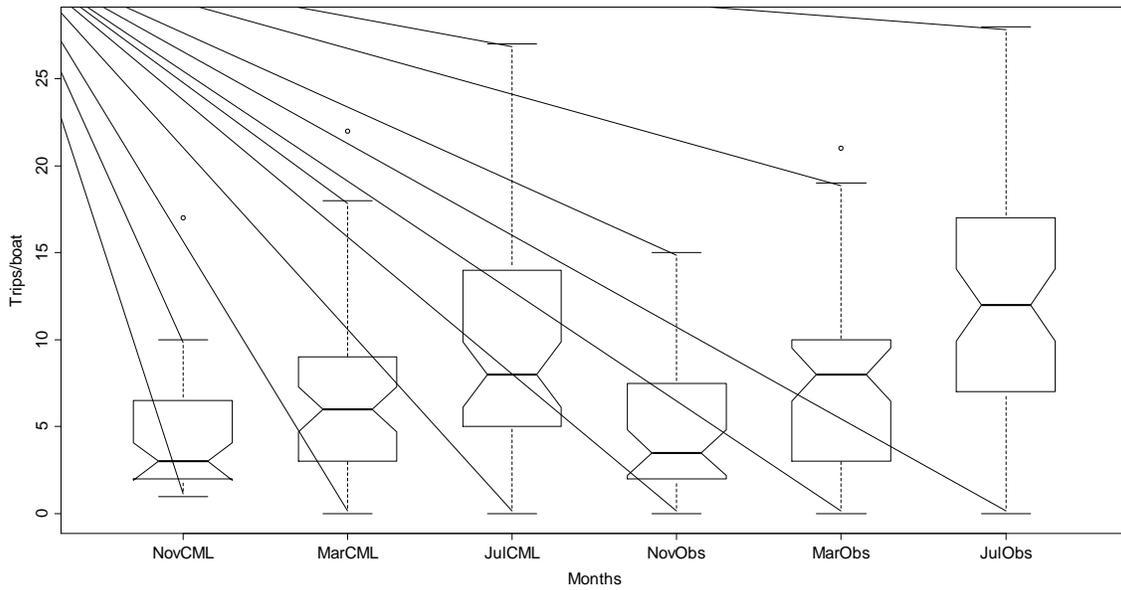


Figure 1. Boxplots for number of fishing trips (per boat) reported (CMLNov, CMLMar, and CMLJul) and observed (ObsNov, ObsMar, and ObsJul) from registered charter vessels. The horizontal bars within the boxes are the medians. Also shown in the boxplots are 25% and 75% quartiles (bottoms and tops of the boxes), fences (connected to the top or the bottom of a box by dash lines), and outliers (empty circles outside the fences). The medians are significantly different ($\alpha = 5\%$) if the notches (above and below the medians) of medians in comparison do not overlap.

(c) Activity surveys on Maui, Oahu, and Kauai

Fishing activities were monitored two times (November 2009 and July 2010) at Lahaina Harbor in Maui. In November, five registered charter vessels were in the November CML report. For one registered chartered vessel name in Maui there are a series of vessels associated with that name (for example, one boat name “Catch Fish” can have vessel series named “Catch Fish Again”, “Catch Fish Too”, “Catch Fish Big”, etc). All boats are involved in charter fishing. In the CML report, the charter trips were reported every day (30 trips) in November with one vessel name by one fisherman. Our survey indicated that all boats in the series were fishing in that month. The total fishing days were 88 based on the survey. Two other registered boats significantly under reported their trips (Table 6). Boat 5 reported all trips as non-chartered trips.

Table 6. Lahaina Harbor (Maui), November 2009, survey results for number of fishing days reported in CML monthly report (Days in CML) versus observed fishing trips (Observed trips), observed fishing days (Observed days fished), and adjusted fishing days (Adjusted days fished).

Boat	Days in	Observed	Observed	Adjusted	Report rate
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	CML	trips	days fished	days fished	
Boat 1	5	4	4	5	1.000
Boat 2	1	4	4	4	0.250
Boat 3	18	26	25	25	0.720
Boat 4	30	94	88	88	0.341
Boat 5	16	27	24	24	0.667
Sum	70	155	145	146	

There were eight other likely charter vessels (based on charter boat listings at the Hawaii Fishing News website and advertisements at the harbor and online) that each made at least five fishing trips in November. They were not registered by charter fishermen in their CML applications/renewals. The total fishing days (with ≥ 4 people on board) was 80. Based on the CML system alone, these boats could not be identified as active charter boats for November 2009. There were no CML reports for fishing trips from these boats in November and these boats were not checked as charter boats by fishermen who were current in November. One of these boats reported two charter trips in January 2009.

In July 2010, five registered charter vessels reported fishing trips (Boats 1-5 in Table 7). One registered boat (NS1) did not submit a CML report, but fished many days in July. Boat 5 has a series of vessels associated with one name. There were six other charter boats that were not shown on the CML charter list. They fished for 127 days.

Table 7. Lahaina Harbor (Maui), July 2010, survey results for number of fishing days reported in CML monthly report (Days in CML) versus observed fishing trips (Observed trips), observed fishing days (Observed days fished), and adjusted fishing days (Adjusted days fished).

Boat	Days in CML	Observed trips	Observed days fished	Adjusted days fished	Report rate
Boat 1	0	1	1	1	0.000
Boat 2	26	32	27	27	0.963
Boat 3	21	24	24	24	0.875
Boat 4	26	29	27	27	0.963
Boat 5	31	221	147	147	0.211
NS1		35	27	27	
Sum	104	342	253	253	

The survey was only conducted once (November 2009) at Nawiliwili Harbor in Kauai. Six registered vessels reported charter trips. Two registered charter boats under reported their trips (less than $\frac{1}{2}$ of what was observed) (Table 8). Two charter boats reported charter trips in CML report but they were not registered as charter boats. One fisherman reported two boats together (Boat 7) and CML showed two records on each day with different fishing areas. The reported trip numbers were similar to the number observed from these two boats, but these two boats had trips on different days as observed by the surveyor.

Table 8. Nawiliwili Harbor (Kauai), November 2009, survey results for number of fishing days reported in CML monthly report (Days in CML) versus observed fishing trips (Observed trips), observed fishing days (Observed days fished), and adjusted fishing days (Adjusted days fished) in the field at Nawiliwili Harbor (Kauai) in November 2009.

Boat	Days in CML	Observed trips	Observed days fished	Adjusted days fished	Report rate
Boat 1	1	0	0	1	1.000
Boat 2	7	7	7	7	1.000
Boat 3	2	3	3	3	0.667
Boat 4	3	9	9	9	0.333
Boat 5	4	6	5	5	0.800
Boat 6	5	18	18	18	0.278
Boat 7	12	11	11	12	1.000
Boat 8	2	3	3	3	0.667
Boat 9		1	1	1	
Boat 10		1	1	1	
Boat 11	0	2	2	2	0.000
Sum	36	61	60	62	

One registered boat filed a DNF report (Boat 11), but two fishing trips were observed in the field. Two registered boats (Boats 9 and 10) appeared at the site (once each) but they did not report their trips at Nawiliwili (they only reported their fishing trips at their home ports of Port Allen and Maalaea). There may have been two charter boats that were not in the current CML system as charter boats. One boat reported in CML as a charter boat in January to April in 2009. That boat reported one non-chartered trip in November, but it was observed to take five trips (with number of people on board ≥ 4). The other boat had advertisement for charter fishing on site and had 12 fishing trips (number of people on board ≥ 4). There was no reporting for that boat in the November CML report.

One survey was carried out at Kewalo Basin Harbor (Oahu) in November 2009. Nine charter boats reported their trips at the harbor. Two of them significantly under reported the trips (Table 9). One captain reported trips from two boats under a name combination (Boat 4). One of these two boats took multiple trips on some days, but only one trip was reported each day. All trips from Boat 4 were reported as non-chartered trips. Two registered vessel (Boats 10 and 12) had DNF reports, but fishing trips were observed in the field. One boat (Boat 11) had 9 trips at Kewalo Basin, but all these trips were reported as chartered trips at a different port. Two fishermen associated with Boats 13-14 did not submit CML reports for November and had 13 daily trips for the month as observed by the surveyor. Boat 14 was reported for 5 non-charted trips at another port by another fisherman who was not in the CML system for charters. These 5 trips were taken on different days from those observed at Kewalo Basin. One unregistered vessel (not in November CML report and not in Table 9) also likely had some charter trips (3 trips with number of people on board ≥ 4).

Table 9. Kewalo Basin Harbor (Oahu), November 2009, survey results for number of fishing days reported in CML monthly report (Days in CML) versus observed fishing trips (Observed trips), observed fishing days (Observed days fished), and adjusted fishing days (Adjusted days fished).

Boat	Days in CML	Observed trips	Observed days fished	Adjusted days fished	Report rate
Boat 1	10	14	14	14	0.714
Boat 2	15	12	12	15	1.000
Boat 3	3			3	1.000
Boat 4	16	36	31	31	0.516
Boat 5	17	11	11	17	1.000
Boat 6	2	1	1	2	1.000
Boat 7	3	2	2	3	1.000
Boat 8	1	1	1	1	1.000
Boat 9	2	8	8	8	0.250
Boat 10	0	3	3	3	0.000
Boat 11		9	9	9	
Boat 12	0	2	2	2	0.000
Boat 13	5	4	4	5	1.000
Boat 14		9	9	9	
Sum	74	112	107	122	

The trips reported and observed at Lahaina Harbor, Nawiliwili Harbor, and Kewalo Basin Harbor are summarized in Tables 10 and 11. The report rate for all registered boats at each harbor range from 50% to 62% in November 2009 (last column in Table 10). Considering the fact that there were a significant number of other likely charter trips (Table 11), the actual report rate could be even lower. The trip counts from the likely charter boats in Table 11 (last column) only included fishing trips with ≥ 4 people on board. In Lahaina, there were more fishing trips observed and reported in July than in November. In July, more multiple trips were taken by some boats within a day. The trips from not registered charter boats were larger than the reported trips in Lahaina (Tables 10 and 11).

Table 10. Summary for trips for registered charter vessels at the other three harbors surveyed in November 2009 including observed trips from boats that did not submit reports or submitted DNF (Did Not Fish) reports. Lahaina Harbor was also surveyed in July 2010. The numbers in the parentheses are number of boats.

Harbor	Days in CML	Adjusted days fished	Boats with report rate > 80%	Trips from no reporting or DNF	Report rate for the harbor
Lahaina (Nov)	70 (5)	139 (5)	1		0.504 (5)
Lahaina (Jul)	104 (5)	226 (5)	3	27 (1)	0.411 (6)
Nawiliwili	36 (8)	58 (8)	4	4 (3)	0.600* (9)
Kewalo	74 (10)	99 (10)	7	23 (4)	0.655* (13)

*The boats that reported all charter trips at different harbors (their home ports) were excluded for the report rate calculation. Note that the number of boats included for the report rate estimation is less than the total number of boats at Nawiliwili Harbor and Kewalo Basin Harbor.

Table 11. Summary of other trip information at the other three harbors surveyed in November 2009 including second trips taken within a day and other likely charter trips observed by the surveyors. Lahaina Harbor was also surveyed in July 2010. The numbers in the parentheses are number of boats.

Harbor	Late reports	Name with multiple boats	Second trips (boats)	Other likely charter trips
Lahaina (Nov)	1	2	9 (4)	78 (8)
Lahaina (Jul)		2	89 (10)	127 (6)
Nawiliwili		1	1 (1)	16 (2)
Kewalo		1	6 (2)	3 (1)

In November 2009, 423 trips were reported in the CML reports from 67 charter boat names at the four harbors surveyed. For these 67 boats that reported non-zero fishing trips, the observed trips by surveyors were 595 (71.1% of the observed trips were reported in CML reports). 41 of these 67 boats reported >80% of their observed trips. 76 trips were observed from 13 charter boats that submitted DNF reports or did not submit any trip reports at the four harbors. The report rate for all registered charter boats was 63.0%. The number of observed trips from likely charter boats (38 vessels) was 229. Including the likely charter trips, the reported trips only accounted for 47.0% of the observed trips.

(d) Comparison of catch between fish reports (charter desk) and CML reports

Billfish, including blue marlin, are one of the major species groups targeted by charter fishermen in Hawaii. Catch and release (number and weight) for blue marlin, striped marlin, and spearfish are recorded by the charter desk at Honokohau for boats that use the weigh station in the harbor. The tables in Appendix 3 include catch and release for boats that reported charter trips in 2009 CML reports. The catch and release in the tables include these from chartered and non-chartered trips (these two kind of trips cannot be separated in the charter desk report).

The overall report rate of blue marlin catch (kept) was 68.1% (184/270) and rate for release was 89.2% (949/1064) at Honokohau in 2009. These rates were higher than average for individual report rates from each boat (Table 2a in Appendix 3). The number of released blue marlin was much higher than the kept blue marlin and the reported rate for release was also higher. Average blue marlin weight in charter desk fish reports is 306.1 lbs and the average from CML is 279.4 lbs (Table 3a in Appendix 3).

The numbers of released and kept striped marlin were much lower than these for blue marlin (Table 4a in Appendix). The overall report rate for catch was 61.0% (36/59)

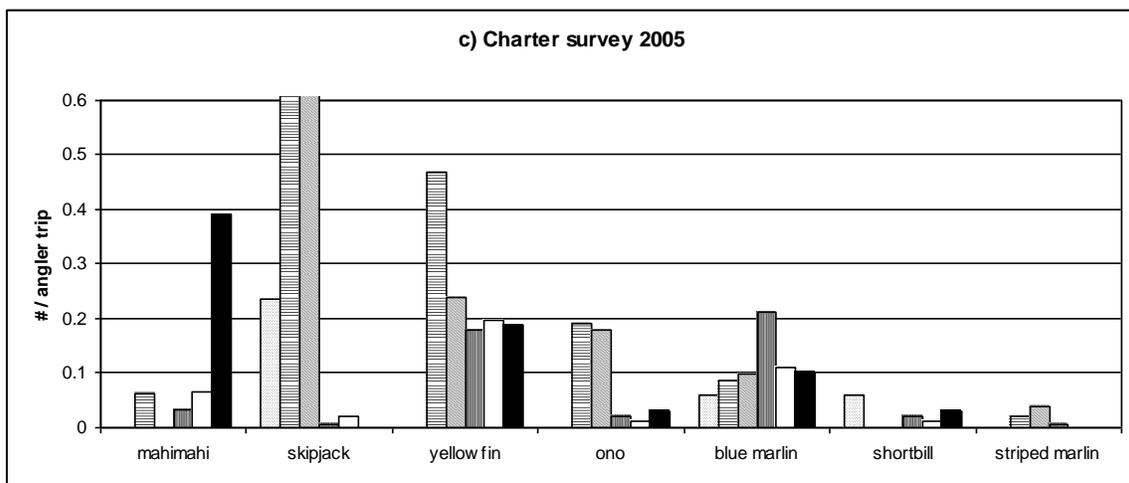
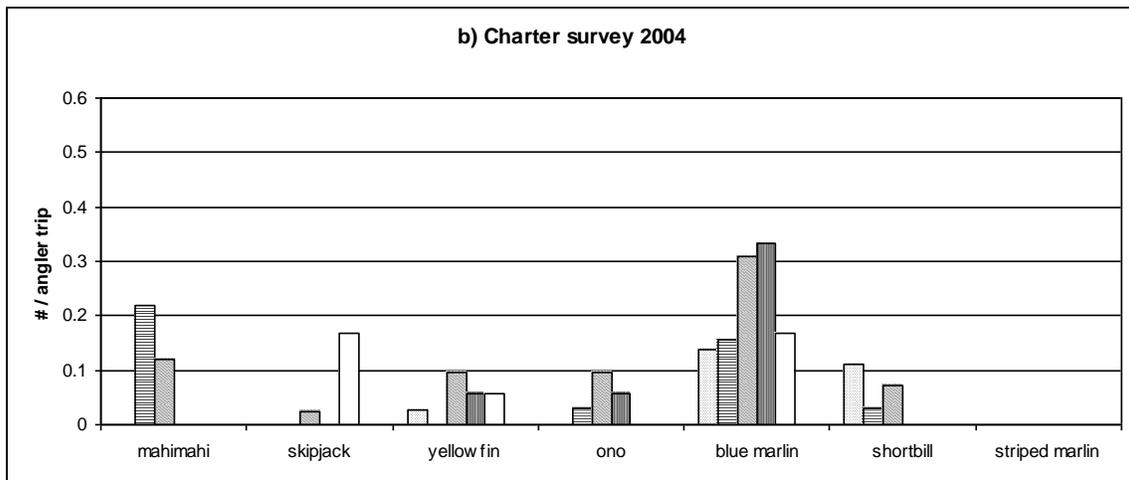
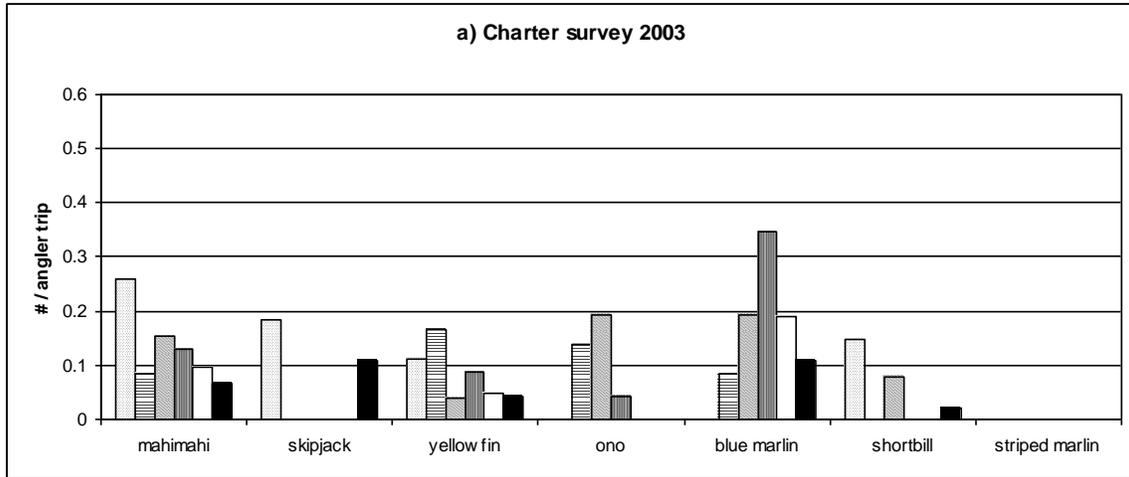
and the rate for release was 78.2% (61/78). The average weight from charter desk fish reports is 74.5 lbs and the average from CML is 64.5 lbs (Appendix Table 5a).

The numbers of kept and released spearfish were lower than those for blue marlin, but higher than these for striped marlin (Table 6a). The report rate for catch was 66.7% (102/153) and the report rate for released spearfish was 75.6% (93/123). The average weight from charter desk fish reports was 34.3 and the average from CML was 33.5, lowest among three billfishes (Appendix Table 7a).

The catch report rates for kept billfish at Honokohau Harbor (61.0-68.1%) were similar to the trip report rate at the harbor (68.9% in November 2009). In July 2010, the surveyor at Lahaina Harbor also tried to get the catch data while monitoring the fishing activity. Using surveying and monitoring to estimate or validate catch is more challenging than for validating charter trips whereas the logs and records from charter desk or other harbor offices can be used for catch validation and estimation, especially for billfish. Lahaina Harbor is smaller than Honokohau Harbor and it was possible to get catch information for most boats in the harbor. One of surveyors there was able to talk to the captains or charter booth staffs to get catch information during his survey in July 2011. The report rate for billfish catch was not as bad as the report rate for the fishing trips. In the report for the boat name with multiple boats, the catch reported included catch from multiple boats. For all five boat names/fishermen that reported in CML, all billfish observed by the surveyor were included in the CML reports while the trip report rate was only 46% for these five boat names (Tables 7 and 10).

(e) Comparison of catch rate from 2003-2005 HMRFS For-Hire survey and CML report

HMRFS included charter boats in 2003-2006. The onsite intercept data were relatively complete for several harbors including Honokohau Harbor, Lahaina Harbor, Maalaea Harbor, and Nawiliwili Harbor. Data for registered charter boats from these harbors in 2003-2006 CML reports were also compiled. Figure 2 displays the data from Honokohau Harbor (see figures in Appendix 4 for data at other sites). According to CML data, the general catch rate (and seasonal variations) for individual species were consistent across different years at Honokohau, Lahaina Harbor, and Maalaea Harbor. At Nawiliwili Harbor, catch rate for yellowfin tuna and skipjack were higher in 2005 than 2006 (Figure 4a in Appendix 4). The catch rates for some species appeared different among different harbors. The catch rate for blue marlin and shortbill spearfish was higher at Honokohau Harbor than at the other three sites. The catch rate for mahimahi at Honokohau Harbor was lower than that at the other three sites. The catch rate for yellowfin tuna was low at two Maui harbors. Nawiliwili Harbor had high catch rate for skipjack and yellowfin tuna. In addition to the difference among different harbors, some species also showed different seasonal variations. The catch rate for blue marlin was higher in the summer and the rate for shortbill spearfish was highest in the first wave (January-February) (Figure 2). The catch rate for mahimahi was lower in the summer (waves 3 and 4).



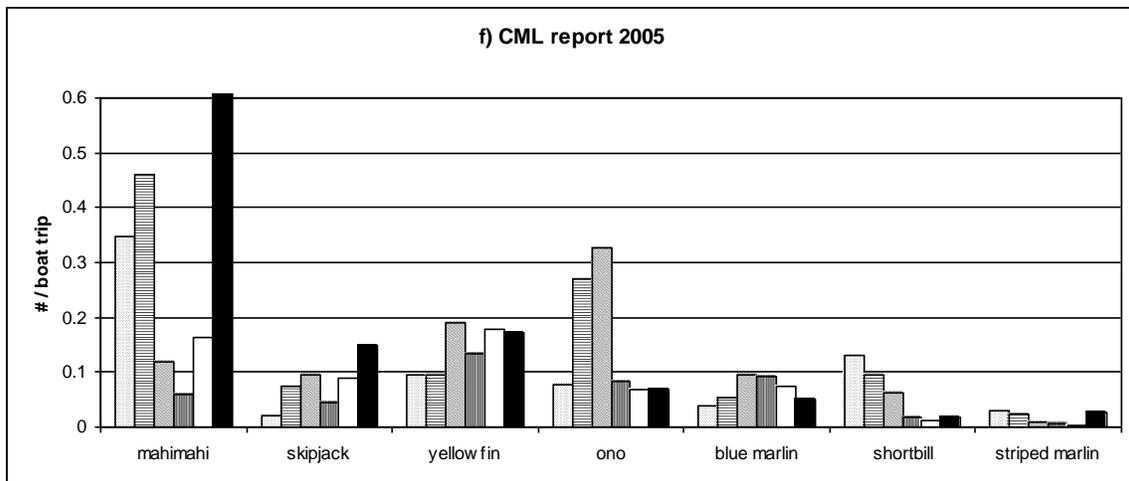
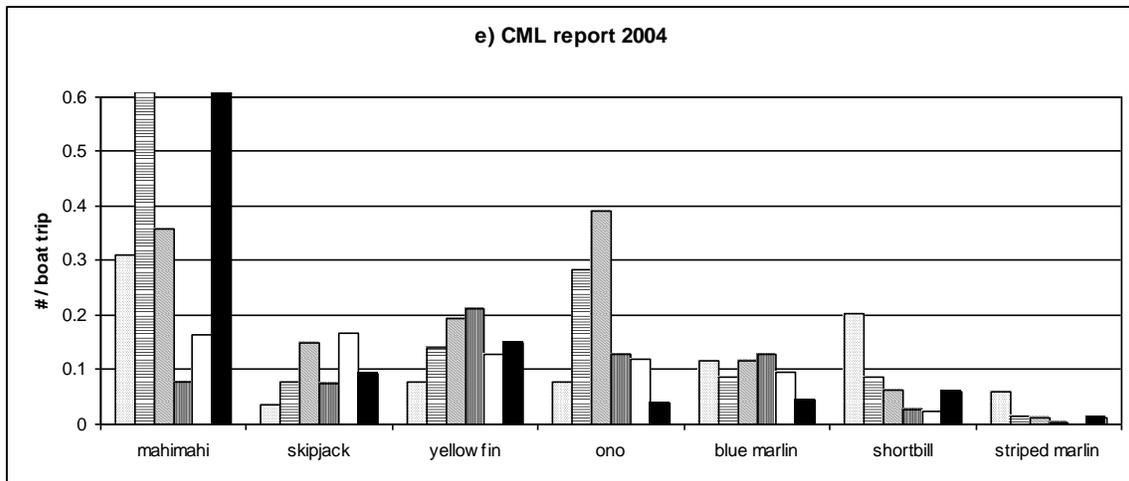
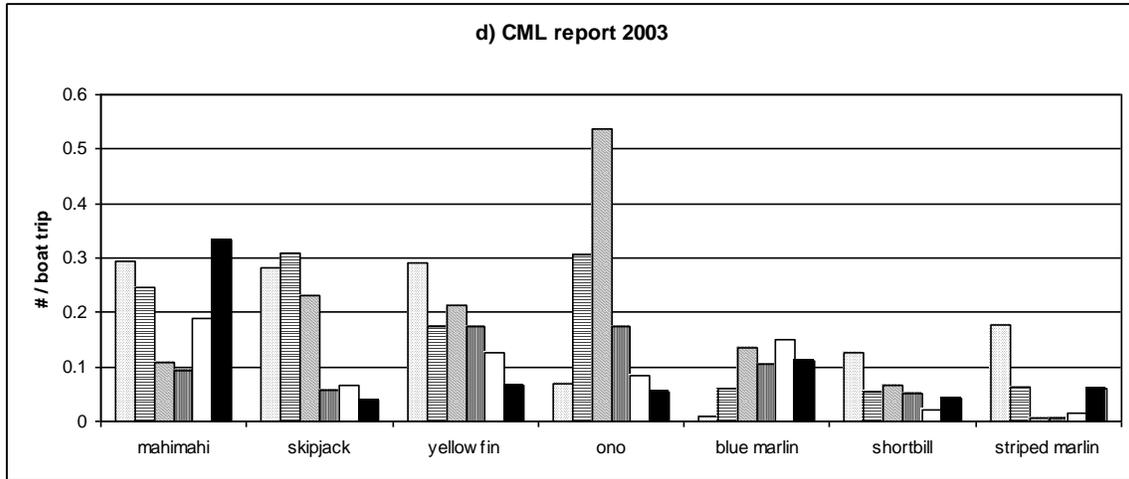


Figure 2. Catch rate estimates from HMRFs For-Hire survey (a-c, # of fish per angler trip) and from CML monthly report (d-f, # of fish per boat trip) at Honokohau Harbor for

six waves in 2003-2005. One wave is for a two-month period. Dotted bars are for wave one, hatched bars are for waves 2-4, blank bars for wave 5 and filled bars for wave 6.

The comparisons between catch rates from CML monthly report and from HMRFs surveys in 2003-2006 are summarized in Table 12. Correlation analyses (correlation coefficient and P value) and regression analyses (regression through origin) were made with rate from CML report as independent variable and rate from the survey report as dependable variable for regression. Ratio is another estimate for comparing catch rates: a ratio estimate with the sum of catch rates from each wave in 2003-2005 HMRFs survey divided by the sum in catch rates from each wave in 2003-2005 CML reports. This ratio is the same as the ratio of average wave catch rates. At Honokohau Harbor, rates from two sources were tightly related for mahimahi, ono, blue marlin, and shortbill spearfish. For blue marlin, the rate from the survey (number of fish per angler trip) was larger than rate from CML (number of fish per boat trip) according to regression and ratio estimates (last row for each site). At Lahaina Harbor, the two rates were tightly related for mahimahi, ono, and striped marlin. The rate from the survey was larger than from CML report for yellowfin tuna. At Maalaea, the two rates were closely related for mahimahi, skipjack, ono, blue marlin, and shortbill spearfish. The rates were larger from survey for yellowfin tuna. At Nawiliwili, the two rates were tightly related for mahimahi, yellowfin tuna, ono, and blue marlin.

According to HMRFs For-Hire survey in 2003-2006, the average number of patrons per boat trip in Honokohau Harbor, Lahaina Harbor, Maalaea Harbor, and Nawiliwili Harbor were 2.9, 4.5, 5.3, and 4.6. The ratios for the two catch rate estimates (number of fish / angler trip from HMRFs For-Hire Survey vs number of fish / boat trip from CML reports) would be 0.34 (1/2.9), 0.22 (1/4.5), 0.19 (1/5.3), and 0.22 (1/4.6) for these harbors if these two methods were directly comparable. The ratios for different species at Nawilwil Harbor were close to 0.22 (Table 12). At other harbors, the ratios for most species were higher than predicted, especially for blue marlin at Honokahau Harbor and yellowfin tuna at two harbors in Maui.

Table 12. The correlation between catch rates from CML reports and HMRFs for-hire survey in 2003-2006. R=correlation coefficient, P=probability, S=slope from regression through origin, R²= R squared value in regression through origin, percentage of variance explained by regression, Ratio=ratio estimator for catch rates from survey and from CML report. Species Mahi = mahimahi, Skip = skipjack tuna, Yellow = yellowfin tuna, Blue = blue marlin, Short = shortbill spearfish, Striped = striped marlin. The numbers for slope and ratio are highlighted when they are both larger than 1, signifying higher catch rate estimation from the survey.

Site		Mahi	Skip	Yellow	Ono	Blue	Short	Striped
Honokohau (Hawaii)	R (P)	0.45 (0.06)	-0.12 (0.65)	0.02 (0.94)	0.85 (0.00)	0.73 (0.00)	0.70 (0.00)	-0.15 (0.55)
	S (R ²)	0.27 (0.54)	0.72 (0.08)	0.64 (0.45)	0.36 (0.81)	1.76 (0.85)	0.54 (0.66)	0.02 (0.01)
	Ratio	0.30	1.33	0.71	0.31	1.72	0.50	0.13

Lahaina (Maui)	R (P)	0.82 (0.00)	0.04 (0.86)	-0.03 (0.90)	0.58 (0.01)	0.02 (0.94)	0.25 (0.32)	0.51 (0.03)
	S (R ²)	0.43 (0.95)	0.33 (0.31)	1.44 (0.12)	0.39 (0.65)	0.75 (0.36)	0.46 (0.35)	0.29 (0.45)
	Ratio	0.44	0.46	3.52	0.40	0.90	0.69	0.32
Maalaea (Maui)	R (P)	0.60 (0.00)	0.44 (0.03)	0.15 (0.49)	0.40 (0.06)	0.49 (0.02)	0.71 (0.00)	0.31 (0.15)
	S (R ²)	0.28 (0.69)	0.33 (0.41)	1.03 (0.13)	0.21 (0.48)	0.58 (0.39)	0.72 (0.65)	0.21 (0.19)
	Ratio	0.29	0.36	3.02	0.27	0.60	0.80	0.24
Nawiliwili (Kauai)	R (P)	0.80 (0.00)	0.48 (0.11)	0.78 (0.00)	0.70 (0.01)	0.88 (0.00)	0.04 (0.91)	
	S (R ²)	0.25 (0.75)	0.20 (0.62)	0.33 (0.78)	0.26 (0.76)	0.39 (0.78)	0.08 (0.03)	
	Ratio	0.22	0.24	0.44	0.25	0.29	0.23	

5. Discussion/Recommendations

(a) Boats that were not registered by fishermen as intended for charter fishing

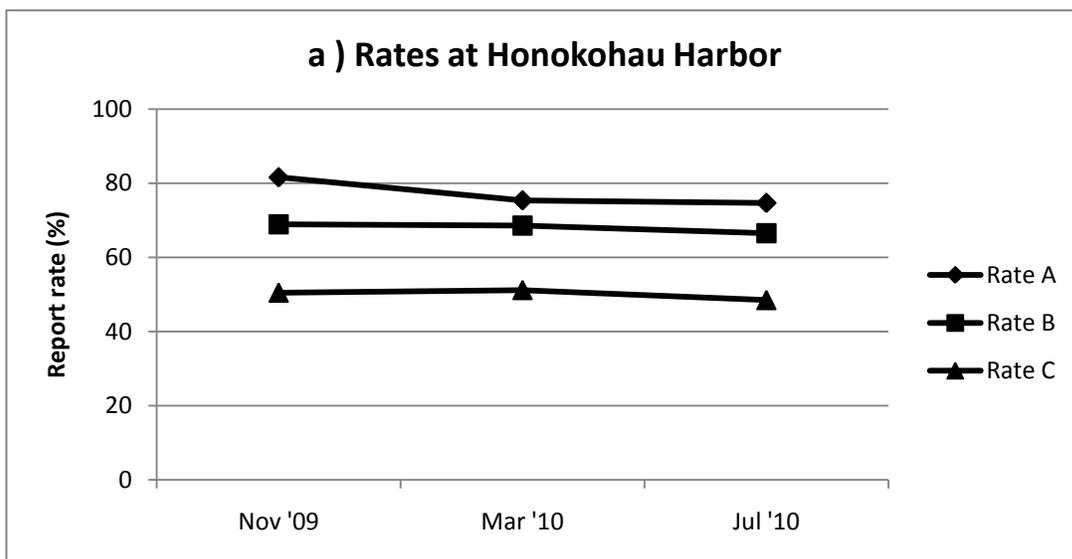
In Hawaii there is not a separate reporting system with the for-hire sector. The charter fishermen, like most fishermen holding CML, submit fishing reports on or before the 10th day of the following month. These reports are designed to log every fishing trip taken by licensed fishermen. The for-hire data are imbedded in the commercial fishery data. There is not an “official” directory for charter vessels in Hawaii. When fishermen apply or renew their commercial marine license, there is an entry for charter (Y/N) under the vessel information. A list of active charter vessels can be indirectly extracted from CML registration files. In addition, there is an entry on the monthly CML report asking whether it was a charter trip. However, there are significant numbers of likely charter vessels that are not indicated by fishermen in their license application/renewal as charter boats at Honokohau Harbor and Lahaina Harbor (Tables 5 and 11). It is unknown if the operators of these charter boats (not on the charter boat list extracted from CML license and monthly report) have CML licenses. For some charter trips reported in the monthly report, the boats associated with these trips were not found in the charter boat list from active license application/renewal. *Outreach is needed to ask fishermen with licenses to include their charter boat information in the application and renewal and to indicate their charter trips as chartered in their monthly reports. One complication is that the fisherman can only put one boat name in the CML application/renewal and can only put one vessel name in one fishing report. Some fishermen (owners or major captains of some charter corporations) may own/operate multiple boats. It is recommended that such fishermen submit separate reports for each boat that they use in the month.*

Small boats in Hawaii can register with Division of Boating and Ocean Recreation (DOBOR). The U.S. Coast Guard licenses boats > 5 tons and inspects commercial fishing vessels for safety requirements. Commercial boats including charter

boats in Hawaii are required to meet national safety standards. The safety equipment is expensive and may take too much space onboard (i.e. less space for patrons for charter boats). Some of standards are designed for the North West region and may be too restrictive for Hawaii. The restrictive safety requirement (when enforced) reduced the number of boats registered for charter fishing (personal communications with HDAR staff). According to an estimate, there might be ~40% of the charter boats in Hawaii that were not licensed for commercial operation and not reporting charter trips. The survey in November 2009 indicated that 88 active charter vessels (as of November 2009) at the four harbors could be identified with the CML registration and reporting system. There were also 38 likely charter vessels (with 229 trips) that could not be affirmed as charter boats with the CML system and were not shown in the CML monthly reports (Tables 5 and 11).

(b) Compliance in CML reporting

Part of the reporting incompliance is provided in Tables 4, 5, 10, and 11. In Honokohau Harbor, 15% to 28% of the reports that reported taking trips were submitted late. The percentage was higher in the summer (Table 5). The observed trips from boats that submitted DNF reports (or did not submit any reports) were 17 to 20% of reported trips (Table 4). In Lahaina Harbor, one to three (out of five) reports were submitted late (Table 11). Fishing trips were also observed at Lahaina Harbor, Nawiliwili Harbor, and Kewalo Basin Harbor from boats that didn't submit reports or submitted DNF reports. These trips accounted for 26% (Lahaina in July 2010), 6% (Nawiliwili), and 19% (Kewalo Basin) of total trips reported (table 10). In May 2009, Department of Land and Natural Resources (DLNR) launched the Civil Resources Violation System (CRVS). For a late report, the first offense allows for fines up to \$15 if the fine is paid within 21 days after the fisherman has received the notice. According to HDAR, this system improved compliance significantly. The results from the study would reflect the improved compliance in report submission after CRVS was in place.



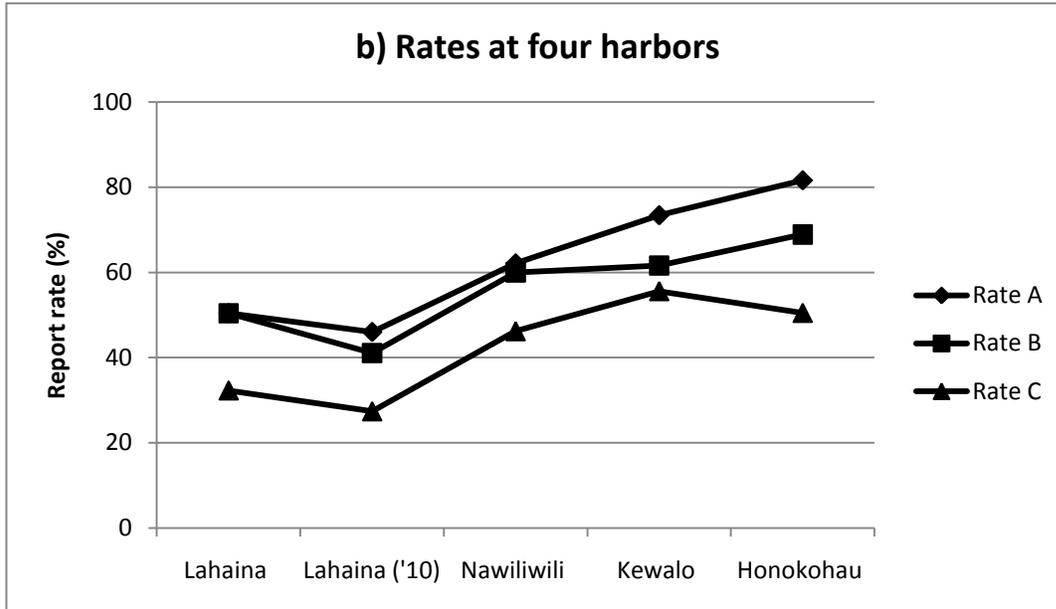


Figure 3. Report rates at Honokohau Harbor in three different months (a) and all four harbors in November 2009 including additional data in July 2010 for Lahaina Harbor (b). Rate A is the report rate for boats that reported taking fishing trips, rate B for all registered boats at the harbor (including registered boats that submitted DNF reports or did not submit any reports at all), and rate C for all charter boats (including likely charter boats at the harbor).

For boats that reported taking fishing trips, the report rates for trips ranged from 75 to 81% in Honokohau and rates were lower in March and July than in November (Rate A in Figure 3). The report rates (for boats that reported taking trips) were 62% at Nawiliwili Harbor and 75% at Kewalo Basin Harbor. The rates were 50% in November and 46% in July at Lahaina Harbor. The low report rate at Lahaina Harbor was due to the fact that there were multiple boats observed in the field for one boat name shown in CML (Boat 4 in Table 6 and Boat 5 in Table 7). In Lahaina Harbor, there was a name combination for two boats (Boat 3 in Table 6 and Boat 4 in Table 7). In Honokohau Harbor, boats B1 (Tables 1-3) and I1 (Tables 1-2) are also name combinations. The reports for B1 included trips from multiple boats under that name. There was also one name combination at Kewalo Basin and one at Nawiliwili. The name combination at Kewalo Basin (Boat 4 in Table 9) only reported half of the trips observed in the field. All trips reported from each of these name combinations (at all four harbors) were reported under one fisherman/captain/owner for each name combination in the month of November. Time overlaps were observed for some boats under one name (or name combination) in the field. In that case, one person could not be simultaneously present on two boats. It appears that some captains or owners of some charter fishing corporations (with multiple boats) might report trips for boats that they were not on physically. It is apparent that some operators did not report the charter trips. *HDAR may ask the operators who are on the vessel to report the charter trips by themselves (rather than by*

the corporate owners or other captains who are not on the vessel) and advise the operators without CML to get their own licenses. When boat owners or captains report for boats that they do not fish on, they may neglect trips without catch. HDAR may also ask fishermen to avoid using boat name combinations (or using one boat name for multiple boats) in the reports, especially when there was more than one boat going out on the same days.

(c) Difficulties in comparing individual trips and validating fishing hours

Some boats were observed to make second trips in a day, especially in March and July 2010 (Tables 5 and 11). It is hard to identify these second trips in CML reports because some fishermen did not separate trips within a day. Additionally, fishermen are supposed to make different entries in CML monthly report for different areas they went to (and for different methods they used in an area) within one trip. For simplicity, we adopt MRFSS definition for a fishing trip as fishing during part or all of one “waking day” in one fishing mode (i.e., shoreline fishing, fishing on a private boat, or fishing on a for-hire vessel). In order to count trips in CML reports, data were sorted by vessel and fishing date and only one record was kept for each date and vessel name combination. For observations from the field survey, the observed trips were converted to daily trips before they were compared with what was reported in CML report. For boat name B1 (for multiple boats, Tables 1-3) in Honokohau Harbor, we were able to identify trips in the CML reports from different boats within a day, with the help of observed trip records. Without field data, it would be impossible to tell whether fishermen reported different entries within a day for multiple trips from one boat or for trips of multiple boats.

It is challenging to compare individual trips (such as the trip durations) from field surveys and CML reports. First of all, the total numbers of trips in the month were not equal from two sources for many boats. Even for boats with similar trip numbers from both sources, their dates may not match. For instance, 14 (out of 45) boats at Honokohau Harbor in November (2009) had the same number of trips reported and observed (Table 1). Among 37 trip days from these boats, 15 trip days did not match in date. In March and July 2010 when each boat took more trips, fewer boats (eight out of > 50 each month) had same amount of trips both in CML reports and from monitoring. However, for these boats with matched trip numbers, the mismatch for dates were lower (four out of 43 trips in March and two out of 164 trips in July). It is possible that some fishermen may more depend on boat log rather than on their memory for CML reporting when there are more trips taken in a month. *One of the advantages of our survey design was to collect “complete” data for a whole month rather than selecting random dates to survey fishing activities. To survey at randomly selected dates may underestimate reporting rates when fishermen report the trips not with the exact dates that they fish.* The fishing hours (fishing gear soak time) reported in CML is hard to evaluate. In many cases, fishermen reported same fishing hours for all trips within the month or even for trips when multiple boats under one name/name combination were out on the same day. In the field survey, different durations (return time – departure time) could be used as an estimate for fishing hours. However, many of the field observations missed one end (departure or return times) of the trip (and travel time to and back from the fishing site can be different on

different days). *It is possible that more frequent (e.g. weekly) reporting may improve the records for individual trips. However, more frequent reports for the charter sector only will increase the management burden for HDAR and increase the reporting burden for charter fishermen.*

(d) Report for catch and release and estimates of catch rates

The report rates for billfish catch in 2009 at Honokohau Harbor ranged from 61% to 68% and the report rates for billfish released were higher, ranging from 75% to 89% (Tables in Appendix 3). The report rates for fishermen/boats that reported their catch/release to the charter desk were biased toward trips with “significant” catch/release. It is unknown whether report rates are similar between trips/boats with significant catch/release and trips/boats without significant catch/release. Future investigation is also needed to see if the report rates for other fish groups (non-billfish groups) are similar to the estimates from this project. The surveyors at Lahaina Harbor also recorded the catch while monitoring the fishing trips. Lahaina Harbor is relatively smaller and retained catch from different boats can be observed without much movement of the surveyors. The CML report rate for billfish catch was much better than the report rate for the fishing trips at Lahaina Harbor. In the report for the boat name with multiple boats, the catch reported combined catch from multiple boats. Trips from all boats under that boat name were much underreported (only one trip was reported each day while multiple boats were fishing on the same days for many days). Catch rate estimates would be inflated if such data are used. *Charter fishermen may be informed that accurate reporting for trip number is important too. Adequate trip reports would better reflect the economic impact of charter sector in Hawaii and would give better estimates for catch rates.*

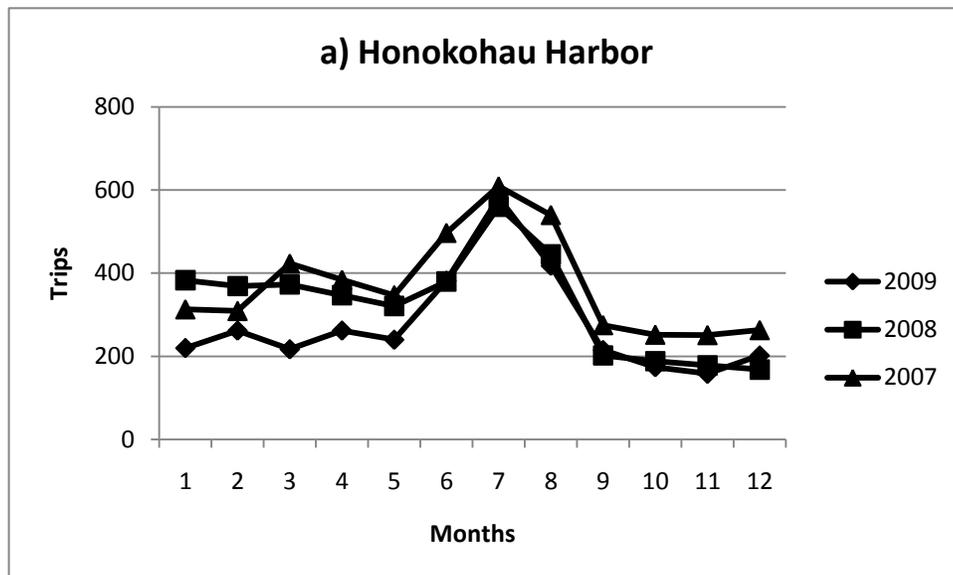
The CML data in 2003-2006 indicated that at most harbors the catch rate and seasonal variations for major fish species were consistent among different years. However, different harbors showed different catch rates for some species. For instance, catch rate for blue marlin and shortbill spearfish was highest at Honokohau Harbor but the rate for mahimahi was lower than at other harbors. *Thus, all major harbors need to be covered in a survey trying to estimate catch rate for different species and season combinations.*

For many species, the catch rate estimates from the two methods (For-Hire survey in 2003-2006 and CML monthly report) were significantly correlated (Table 12). The rate estimates in number / boat trip (from CML monthly reports) should be larger than the rate estimates in number / angler trip (from HMRFS For-Hire survey) by some factors (i.e., average number of patrons per boat). The higher catch rates for blue marlin from For-Hire survey at Honokohau than from CML estimates were an indication of inconsistency and probably resulted in bias in the intercepts collected by surveyors. The for-hire survey site at Honokohau was near the weigh station in the harbor. The boats interviewed were likely to be boats with higher catch rate for blue marlin. The boats stopping by the weigh station to have the catch weighed were more likely to have blue marlin in their catch. It is not clear why catch rate for yellowfin tuna at two Maui harbors were higher from For-Hire survey than from CML reports, but bias in sample selection is a likely candidate.

Underreporting for small yellowfin tuna in CML reports is also possible because they might not contribute much to the catch weight and could be neglected in the reports.

(e) Synthesis of trip report rates and billfish catch

According to CML reports in 2007-2009, the charter trips from four surveyed harbors (7645 in 2007, 7013 in 2008, and 5821 in 2009) accounted for 68-73% of the total reported charter trips in the state. Honokohau harbor is the biggest charter boat harbor in the state and is most active in summer months (Figure 4). This pattern is not clear at the other three harbors. The survey continued in March and July 2010 at Honokohau Harbor in attempts to characterize the reporting rate during a season when fishing activity is different. For Honokohau Harbor and Lahaina Harbor where fishing activity was also monitored in July 2010, more reports were submitted late for July (Tables 5 and 11). The report rates were similar among seasons within a harbor but different among harbors (Figure 3). The overall report rate (Rate C in Figure 3) in Honokohau was consistent (~50%) in three months (seasons). The overall report rate in Lahaina was lower (~30%) due to high proportion of charter boats not shown in the Hawaii CML system. If the overall report rates at Nawiliwili Harbor (47% in November 2009) and Kewalo Basin Harbor (64% in November 2009) did not vary much among seasons, the charter trips from these four major charter harbors might be under reported in the CML by approximately 50% in 2009 and 2010. *Based on the data from the four harbors in November 2009, the report rate for all registered charter boats was 64% and the report rate for all charter boats (including likely charter boats) was 48%. Such proportions may be applied to the reported trips in CML reports to adjust underreporting and non-reporting for charter trips. It is unclear what the report rates might be before the Civil Resources Violation System (CRVS) was in place (in May 2009). Repeated survey/monitoring will be needed especially when there are changes in report requirements and report management policies.*



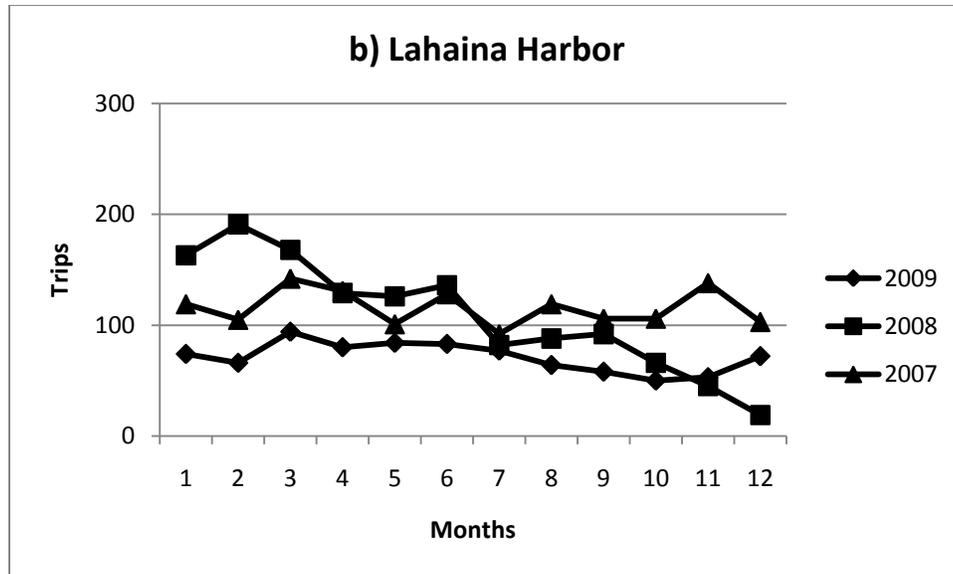


Figure 4. Charter boat monthly trips at a) Honokohau Harbor (Hawaii, or Big Island) and b) Lahaina Harbor (Maui) from 2007-2009 commercial marine license catch reports.

The common species (based on catch weight) reported in CML reports from charter fishing include yellowfin tuna, mahimahi, blue marlin, wahoo, skipjack tuna, striped marlin, bigeye tuna, and shortbill spearfish. Among these common species, the catches for blue marlin, shortbill spearfish, and striped marlin were more than 10% of catch weight estimates for the same species in 2007 HMRFS (including catch estimates from shoreline and private boat fishing). Only catch for blue marlin from charter fishing was > 10% of the commercial landing estimates, based on 2007 data (Hamm et al., 2009). Thus, billfish are important components for charter fishing catch in Hawaii. According to the catch data from 2009 CML reports, the surveyed four harbors contributed more than 68% for kept catch and more than 80% for released billfish, with Honokohau Harbor playing the most important role (Table 13). In this report, the data from the charter desk at Honokohau Harbor were used for estimating report rate for billfish catch. *The total catch from the charter desk fish report should be explored and may be used to estimate and validate total billfish catch, at least for Honokohau Harbor. For other major charter boat harbors, there may be records for billfish catch as well. For example, the author of Maui Seawatch for Hawaii Fishing News magazine keeps historic logs for significant catch from charter boats at Lahaina Harbor.*

Table 13. Billfish catch (number of individuals) from 2009 CML reports for charter fishing at four surveyed harbors.

Harbor	Fishing trips	Blue marlin		Striped marlin		Spearfish	
		Kept	Release	Kept	Release	Kept	Release
Honokohau	3332	213	907	47	62	115	101
Lahaina	855	35	22	10	3	6	4

Nawilwili	620	20	3	1	0	5	0
Kewalo	1014	118	11	30	1	32	2
Sum of 4 harbors	5821	386	943	88	66	158	107
Total (for state)	8591	519	1029	129	80	174	117
Ratio of 4 harbors to state total	0.68	0.74	0.92	0.68	0.83	0.91	0.91

(f) Conclusions

Based on the data in November 2009 at four monitored harbors, fishing trips reported by charter boats in the general fishing reports (submitted monthly) underestimated the trips by 36% due to underreporting and non-reporting for charter boats in the CML system. Many charter boats were not on the CML charter list. Some of these charter boats were excluded because only one vessel name (or name combination) can be put in one CML application and in one page of CML report. Some owners or captains may fish on multiple boats. *In order to include more charter boats in the CML reporting system, the CML application and renewal should be modified so that multiple vessel names can be included in one form. For owners and captains who use multiple vessels, they can be asked to submit separate reports for each boat used. To improve the report rate for the charter boats on the charter list, outreach is needed to inform that reporting all trips (including zero catch trips) is as important as reporting catch.*

Acknowledgements

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6. Reference

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Western Pacific Regional Fishery Management Council. 2006. Pelagic Fisheries of the Western Pacific Region – 2005 Annual Report. 277p.

BF Boat - Does the boat have a BF registration (i.e. see BF label on the boat)? Y=yes, N=no.

Charter - Is it a charter boat, using the best judgment? Y=yes, N=no, U=unknown. A charter boat is a small for-hire vessel operating under charter for a price and specific amount of time. A licensed captain operates it and crew and the participants are part of a pre-formed group of anglers. Charters are usually closed parties (friends, family members, etc.) and not open to public. They can make full or half day trips.

Fishing - Based on the best judgment, does it look like that fishing is to be done or has been done? Y=yes, N=no, U=unknown.

of People - The number of people that can be seen on board including captain and crew. If the number is large (>9), just give the range, i.e. ≥ 10 or 10-20.

Activity - Include fishing, diving (SNUBA), snorkeling, sailing, and parasailing. Can be more than one activity.

Depart/Return Time – Report departing and returning part of a boat trip as separate entries. Record 6:00 AM as 06:00 and 5 PM as 17:00.

Remarks - Include seeing fish on the boat, fish being unloaded from the boat, or flags being flown for catching the major “flagged” species.

Comments - Observations about how the day went such as when/if it was tricky to count boats.

Appendix 2: Tables and Figures from Maui test surveys

Table 1 shows the results from the test survey at Maalaea harbor. The surveyors were at the site 10 hrs (6:00 to 16:00) for 8 days in August 2009. The trip durations ranged from 3 hr 41min to 8hr 30 min. Most trips started early in the morning with only one trip starting in the afternoon (second trip for Boat 4 for that day). Among 23 boat trips recorded (taken by six charter boats), there were only one missed depart time and one missed return time. The boat trip without a return time recorded was the second trip for a boat in that day, the only second trip in the records.

Table 1a: Charter boat activity at Maalaea (Aug 23-30, 2009)

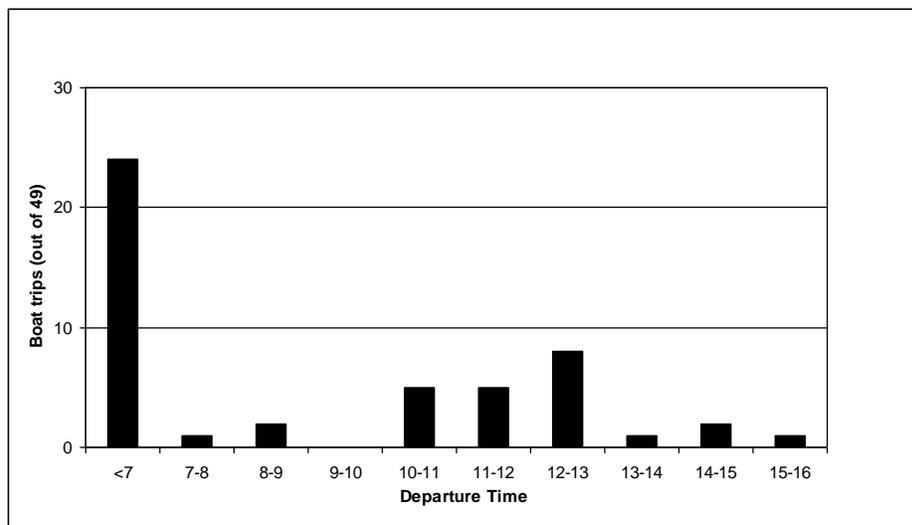
Boat	Date	Charter	Fishing	No of people	Activity	Depart	Return	Duration
Boat 1	23-Aug	Y	Y	10	fishing		13:23	
Boat 1	24-Aug	Y	Y	6	fishing	6:04	14:34	8:30
Boat 2	24-Aug	Y	Y	6	fishing	6:24	10:52	4:28
Boat 3	24-Aug	Y	Y	6	fishing	6:42	12:21	5:39
Boat 4	24-Aug	Y	Y	6-9	fishing/snorkeling	7:00	12:03	5:03
Boat 5	24-Aug	Y	Y	6	fishing	7:38	11:28	3:50
Boat 1	25-Aug	Y	Y		fishing	6:09	12:00	5:51
Boat 3	25-Aug	Y	Y		fishing	6:38	12:26	5:48
Boat 2	25-Aug	Y	Y	6	fishing	6:52	12:46	5:54
Boat 5	25-Aug	Y	Y	10	fishing	7:29	11:10	3:41
Boat 1	26-Aug	Y	Y	3	fishing	6:10	14:07	7:57
Boat 3	26-Aug	Y	Y	10	fishing	6:37	12:14	5:37
Boat 5	26-Aug	Y	Y	6	fishing	7:11	11:36	4:25

Boat 4	27-Aug	Y	Y	6	fishing/snorkeling	7:04	11:53	4:49
Boat 4	27-Aug	Y	Y	6-10	fishing	13:10		
Boat 2	28-Aug	Y	Y	6	fishing	6:26	14:01	7:35
Boat 1	28-Aug	Y	Y	10	fishing	7:00	11:48	4:48
Boat 6	28-Aug	Y	Y	6	fishing		9:48	
Boat 3	29-Aug	Y	Y	10	fishing	6:30	12:28	5:58
Boat 4	29-Aug	Y	Y	10	fishing/snorkeling	7:05	11:58	4:53
Boat 3	30-Aug	Y	Y	6	fishing	6:30	13:01	6:31
Boat 5	30-Aug	Y	Y	10	fishing	7:32	11:32	4:00
Boat 4	30-Aug	Y	Y	6	snorkeling/fishing	9:49	13:50	4:01

More than 70 fishing trips (taken by 17 charter boats) were observed at Lahaina Harbor for 7 days (August 16-22, 2009). About half of the trip records were with missing departure time or return time, presumably departing earlier than 6:00 AM or returning later than 17:00 (or 16:00 on some days when the surveyors only stayed until 16:00). For the trips with observed departure times, half of the trips left before 7:00 AM (actually all before 6:30 AM). Significant number of boats left between 10:00 to 13:00 (not many between 7:00 and 10:00). Nine 2nd trips were observed, all departing between 10:00 and 13:00. The return times were spread evenly between 9:00 to 15:00. Fewer boats returned between 15:00 and 17:00.

On 90% of observed boat trips, there were 6-9 people on board (including captains and crew), consistent with the fact that charter boats take a maximum of 6 patrons on charter trips in Hawaii.

For the complete trips (with observed departure AND return time), most trips lasted for 3-5 and 7-9 hours, indicating that full day trips (8 hr) and half day trips were common and ¾ day trips (6 hrs) were not as common.



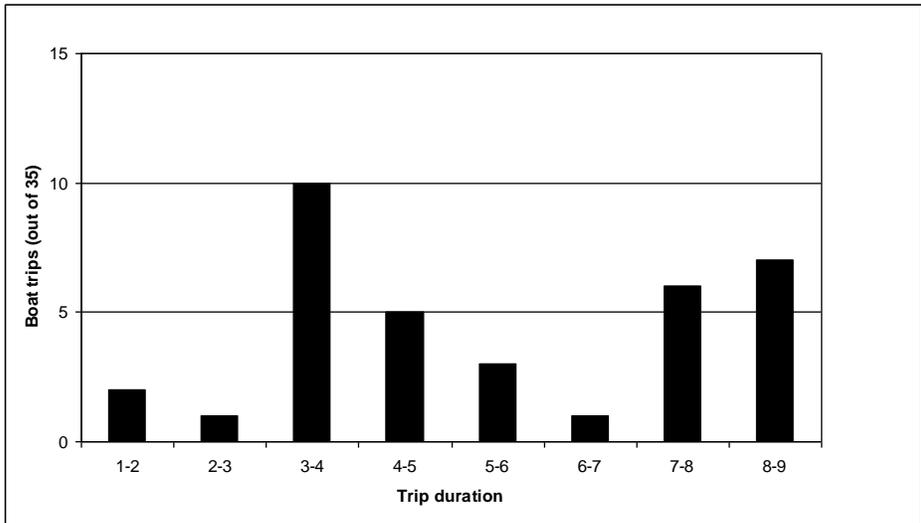
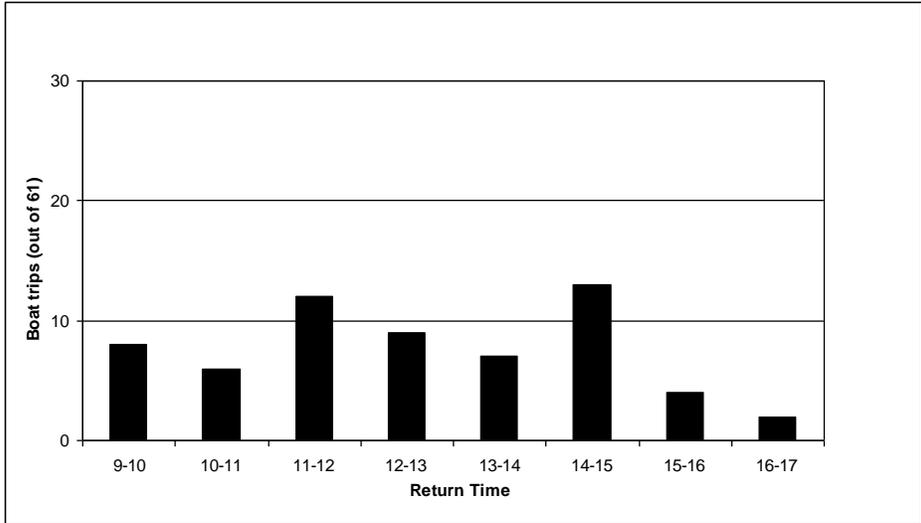


Figure 1a. Departure and return times and trip durations observed at Lahaina Harbor (August 16-22, 2009)

Appendix 3: Tables for catch and release at Honokohau Harbor.

Table 2a. Blue marlin catch and release reported in CML monthly report (CML) and charter desk fish report (HFN). As in Tables 1-4, adjusted catch and release are used for report rate calculations (to keep the maximum report rate = 1). Adjusted catch and release are mostly equal to HFN kept and release and are only replaced with CML kept and release when HFN values < CML values. The total adjusted catch (kept) is 270 and the total adjusted release is 1064.

Boat name	HFN kept	HFN release	CML kept	CML release	Report rate (kept)	Report rate (release)
A1	1	3	3	4	1.000	1.000

A2	10	38	6	50	0.600	1.000
B1	19	1	6	0	0.316	0.000
B2	30	34	53	112	1.000	1.000
B3	0	16	0	21		1.000
C1	3	5	1	6	0.333	1.000
D1	1	7	0	0	0.000	0.000
F1	1	21	2	37	1.000	1.000
F2	0	18	1	30	1.000	1.000
F3	2	39	0	0	0.000	0.000
H1	4	0	3	1	0.750	1.000
H2	6	8	6	7	1.000	0.875
H3	19	22	9	42	0.474	1.000
H4	5	52	2	45	0.400	0.865
H5	14	28	7	39	0.500	1.000
H6	0	2	0	6		1.000
H7	0	5	0	18		1.000
H8	0	22	1	27		1.000
I1	14	41	5	36	0.357	0.878
I2	8	36	9	38	1.000	1.000
K1	1	1	0	12	0.000	1.000
K2	2	50	1	41	0.500	0.820
K3	2	11	1	12	0.500	1.000
K4	1	0	0	5	0.000	1.000
K5	1	8	0	16	0.000	1.000
L1	1	7	1	9	1.000	1.000
L2	1	10	1	13	1.000	1.000
L3	2	1	1	0	0.500	0.000
L4	3	15	1	14	0.333	0.933
L5	2	7	1	25	0.500	1.000
L6	37	4	25	0	0.676	0.000
L7	2	18	2	34	1.000	1.000
L8	1	0	0	0	0.000	
M1	3	1	0	1	0.000	1.000
M2	9	36	7	52	0.778	1.000
M3	2	38	5	23	1.000	0.605
M4	2	4	2	3	1.000	0.750
N1	1	3	0	0	0.000	0.000
N2	4	74	5	74	1.000	1.000
P1	3	17	5	17	1.000	1.000
P2	1	0	5	0	1.000	
P3	2	20	0	14	0.000	0.700
S1	0	23	0	28		1.000
T1	0	1	0	2		1.000
T2	8	0	6	0	0.750	
T3	2	33	0	18	0.000	0.545
W1	0	2	1	17	1.000	1.000
sum/mean	230	782	184	949	0.567	0.818

Table 3a. Weight for blue marlin at Honokohau Harbor in 2009

Boat name	HFN kept	HFN weight	CML kept	CML weight	Mean W_HFN	Mean W_CML
A1	1	209	3	450	209.00	150.00
A2	10	3329.5	6	1831	332.95	305.17
B1	19	6169.5	6	1445	324.71	240.83
B2	30	10129	53	12617	337.63	238.06
B3	0		0			
C1	3	779.5	1	450	259.83	450.00
D1	1	157	0		157.00	
F1	1	269	2	455	269.00	227.50
F2	0		1	175		175.00
F3	2	437.5	0	0	218.75	
H1	4	721.5	3	841	180.38	280.33
H2	6	2941	6	2535	490.17	422.50
H3	19	5283	9	3523	278.05	391.44
H4	5	2337.5	2	584	467.50	292.00
H5	14	3256	7	2292	232.57	327.43
H6	0		0			
H7	0		0			
H8	0		1	85		85.00
I1	14	4748	5	2099	339.14	419.80
I2	8	2173	9	2751.5	271.63	305.72
K1	1	379.5	0		379.50	
K2	2	328	1	150	164.00	150.00
K3	2	899.5	1	450	449.75	450.00
K4	1	347.5	0		347.50	
K5	1	200	0		200.00	
L1	1	111.5	1	149	111.50	149.00
L2	1	458	1	458	458.00	458.00
L3	2	963.5	1	698	481.75	698.00
L4	3	853.5	1	451	284.50	451.00
L5	2	488.5	1	399	244.25	399.00
L6	37	6768	25	4599	182.92	183.96
L7	2	689.5	2	689	344.75	344.50
L8	1	235	0		235.00	
M1	3	1368.5	0		456.17	
M2	9	3614	7	3459	401.56	494.14
M3	2	1510	5	968	755.00	193.60
M4	2	404	2	406	202.00	203.00
N1	1	118	0		118.00	
N2	4	1263	5	1373	315.75	274.60
P1	3	1803	5	1550	601.00	310.00
P2	1	268	5	1267	268.00	253.40
P3	2	1071	0		535.50	
S1	0		0			
T1	0		0			
T2	8	2440.5	6	1901.5	305.06	316.92

T3	2	872.5	0		436.25	
W1	0		1	312		312.00
sum/mean	230	70394.5	184	51413	324.26	311.00

Table 4a. Striped marlin catch and release reported in CML monthly report (CML) and charter desk fish report (HFN). The total adjusted catch (kept) is 59 and the total adjusted release is 78.

Boat name	HFN kept	HFN release	CML kept	CML release	Report rate (kept)	Report rate (release)
A1	2	0	0	0	0.000	
A2	0	1	0	0		0.000
B1	2	0	2	0	1.000	
B2	4	7	10	15	1.000	1.000
B3	1	2	2	4	1.000	1.000
C1	0	1	0	1		1.000
D1	1	0	1	0	1.000	
F1	0	1	0	3		1.000
F2	1	0	0	1	0.000	1.000
F3	1	0	0	0	0.000	
H1	0	2	1	3	1.000	1.000
H2	5	2	2	1	0.400	0.500
H3	1	3	0	1	0.000	0.333
H4	4	1	1	0	0.250	0.000
H5	0	2	0	4		1.000
I1	0	5	0	1		0.200
I2	3	0	8	0	1.000	
K1	0	1	0	1		1.000
K2	0	1	0	0		0.000
K3	0	3	0	0		0.000
L1	1	6	0	4	0.000	0.667
L2	0	1	1	3		1.000
L3	6	0	0	0	0.000	
L4			3	0	1.000	
M1	1	0	1	0	1.000	
M2	1	0	2	0	1.000	
M3	0	1	0	1		1.000
N1	1	0	0	0	0.000	
N2	4	13	0	16	0.000	1.000
S1	0	1	0	2		1.000
T1	2	0	2	0	1.000	
T2	0	2	0	0		0.000
sum/mean	41	56	36	61	0.533	0.652

Table 5a. Weight for striped marlin at Honokohau Harbor in 2009

Boat name	HFN kept	HFN weight	CML kept	CML weight	Mean W_HFN	Mean_CML
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A1	2	140	0		70.00	
A2	0		0			
B1	2	82	2	141	41.00	70.50
B2	4	253	10	584	63.25	58.40
B3	1	70	2	105	70.00	52.50
C1	0		0			
D1	1	98	1	100	98.00	100.00
F1	0		0			
F2	1	90	0		90.00	
F3	1	70	0	0	70.00	
H1	0		1	31		31.00
H2	5	342.5	2	234	68.50	117.00
H3	1	50	0		50.00	
H4	4	340	1	80	85.00	80.00
H5	0		0			
I1	0		0			
I2	3	236.5	8	521.5	78.83	65.19
K1	0		0			
K2	0		0			
K3	0		0			
L1	1	144.5	0		144.50	
L2	0		1	60		60.00
L3	6	534.5	0		89.08	
L4			3	150		50.00
M1	1	60	1	60	60.00	60.00
M2	1	46	2	94	46.00	47.00
M3	0		0			
N1	1	102	0		102.00	
N2	4	287.5	0		71.88	
S1	0		0			
T1	2	150	2	160	75.00	80.00
T2	0		0			
sum/mean	41	3096.5	36	2320.5	76.28	67.05

Table 6a. Spearfish catch and release reported in CML monthly report (CML) and charter desk fish report (HFN). The total adjusted catch (kept) is 153 and the total adjusted release is 123.

Boat name	HFN kept	HFN release	CML kept	CML release	Report rate (kept)	Report rate (release)
A1	0	1				0.000
A2	2	6	1	10	0.500	1.000
B1	7	1	0	0	0.000	0.000
B2	9	0	37	12	1.000	1.000
B3	0	2	5	1	1.000	0.500
C1			0	1		1.000
D1	0	1	0	0		0.000

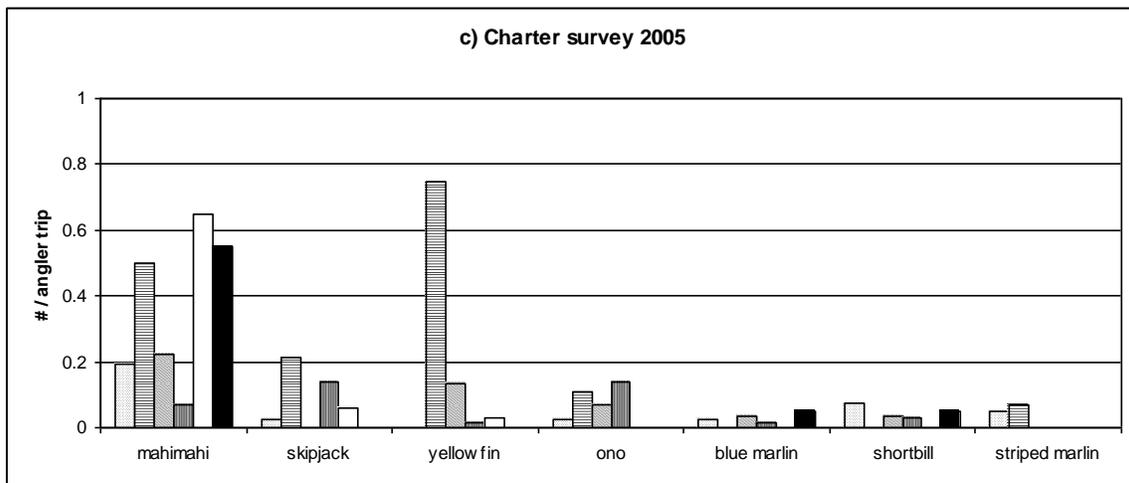
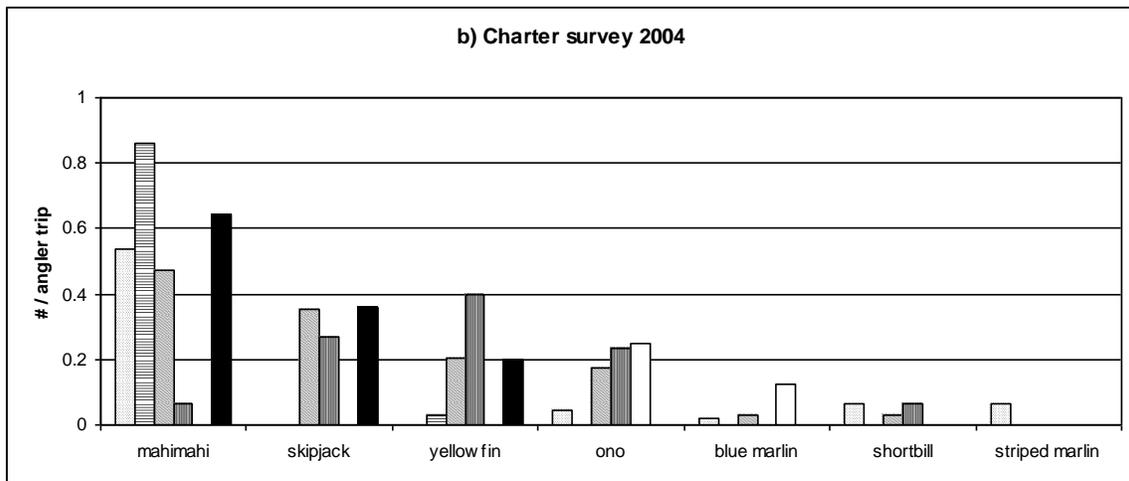
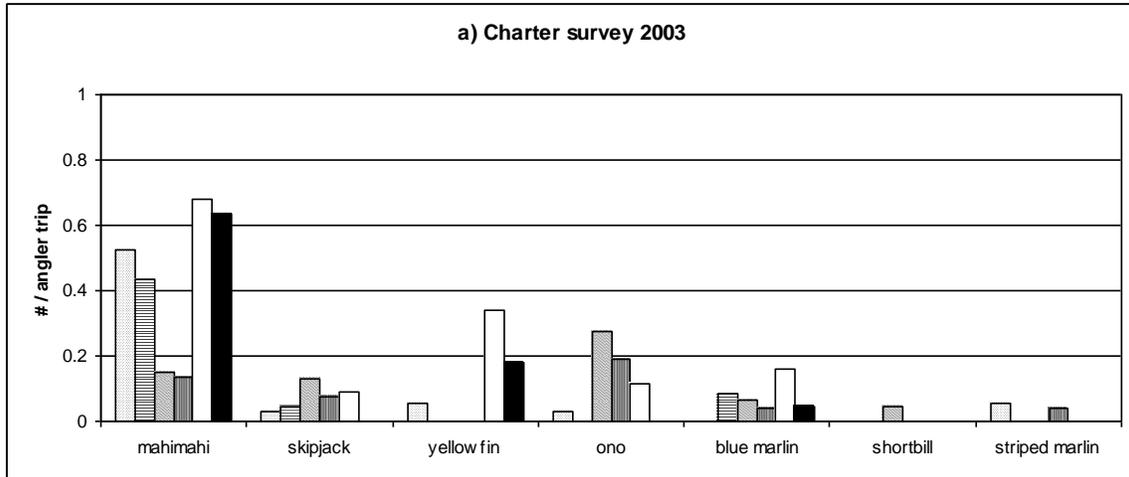
F1	1	2	6	4	1.000	1.000
F2			1	0	1.000	
F3	1	6	0	0	0.000	0.000
H1	1	0	3	0	1.000	
H2	2	2	2	7	1.000	1.000
H3	4	2	0	1	0.000	0.500
H4	5	3	4	1	0.800	0.333
H5			3	2	1.000	1.000
H6			0	5		1.000
I1	9	4	2	2	0.222	0.500
I2	4	0	8	0	1.000	
K1	4	4	5	1	1.000	0.250
K2	2	0	4	0	1.000	
K3	2	0	0	0	0.000	
L1	0	3	0	3		1.000
L2	1	2	3	1	1.000	0.500
L3	2	11	1	11	0.500	1.000
L4	0	2	2	5		1.000
L5	9	0	0	0	0.000	
L6	2	2	2	3	1.000	1.000
M1	5	3	8	4	1.000	1.000
M2	15	2	0	0	0.000	0.000
N1	0	7	0	4		0.571
P1	1	0	0	0	0.000	
P2	3	6	2	2	0.667	0.333
S1	0	8	0	10		1.000
T1			0	2		1.000
T2	4	0	3	0	0.750	
T3	0	3	0	1		0.333
sum/mean	95	83	102	93	0.632	0.636

Table 7a. Weight for spearfish at Honokohau Harbor in 2009.

Boat name	HFN kept	HFN weight	CML kept	CML weight	Mean W_HFN	Mean W_CML
A1	0					
A2	2	56	1	30	28.00	30.00
B1	7	204.5	0		29.21	
B2	9	317	37	1177.5	35.22	31.82
B3	0		5	155		31.00
C1			0			
D1	0		0			
F1	1	52	6	265	52.00	44.17
F2			1	35		35.00
F3	1	35	0	0	35.00	
H1	1	38	3	93	38.00	31.00
H2	2	79	2	80	39.50	40.00
H3	4	130	0		32.50	

H4	5	170	4	131	34.00	32.75
H5			3	80		26.67
H6			0			
I1	9	280	2	93	31.11	46.50
I2	4	140	8	265	35.00	33.13
K1	4	155	5	180	38.75	36.00
K2	2	60	4	111	30.00	27.75
K3	2	75	0		37.50	
L1	0		0			
L2	1	35	3	118	35.00	39.33
L3	2	60	1	25	30.00	25.00
L4	0		2	75		37.50
L5	9	330	0		36.67	
L6	2	69	2	61.5	34.50	30.75
M1	5	168.5	8	270	33.70	33.75
M2	15	531.5	0		35.43	
N1	0		0			
P1	1	38	0		38.00	
P2	3	104.5	2	66	34.83	33.00
S1	0		0			
T1			0			
T2	4	132.5	3	107	33.13	35.67
T3	0		0			
sum/mean	95	3260.5	102	3418	35.09	34.04

Appendix 4: Figures for catch rates at Lahaina, Maalaea, and Nawiliwili.



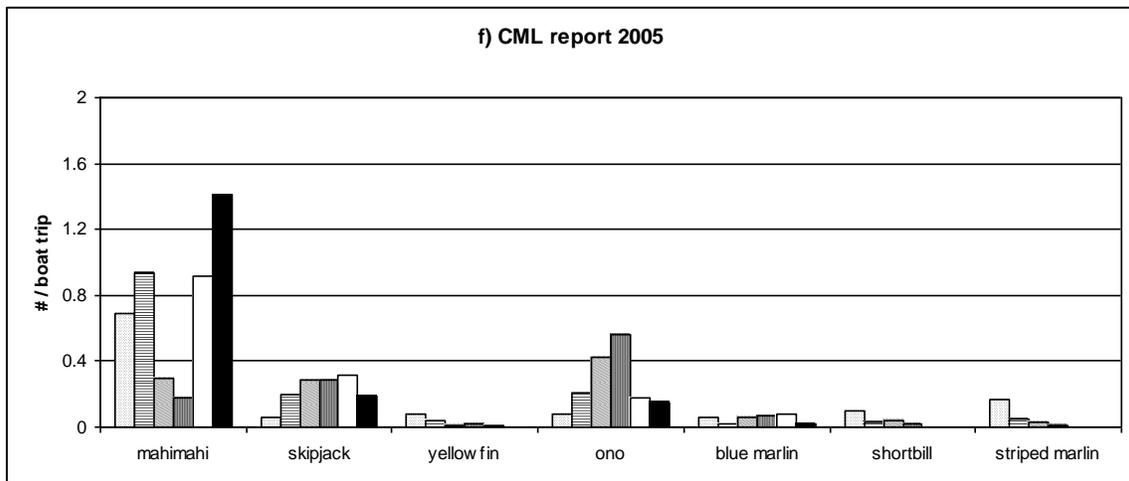
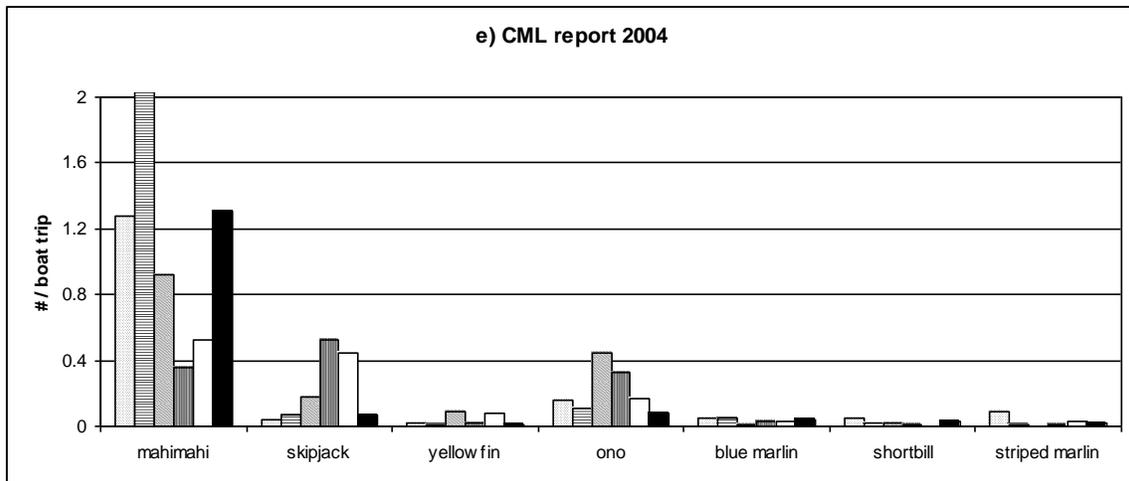
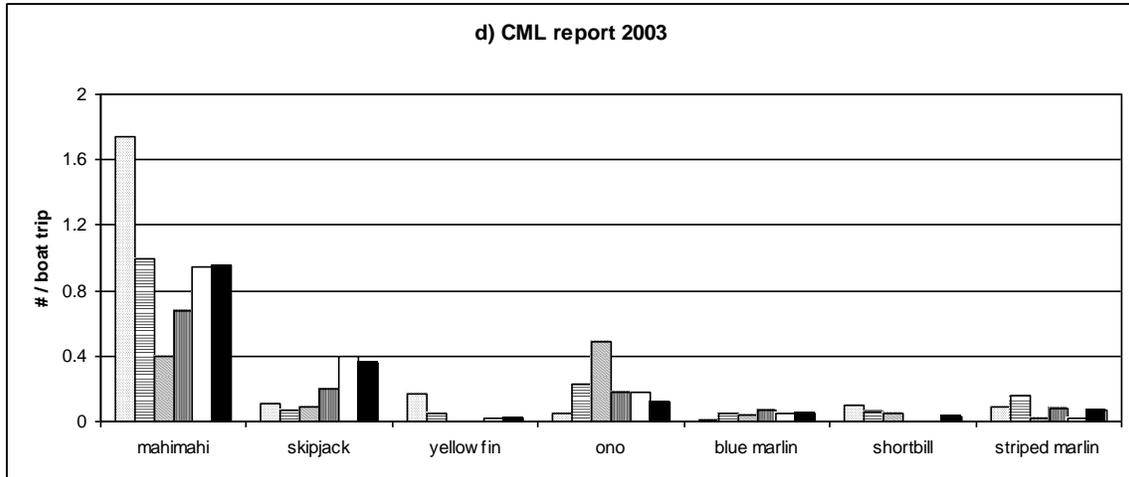
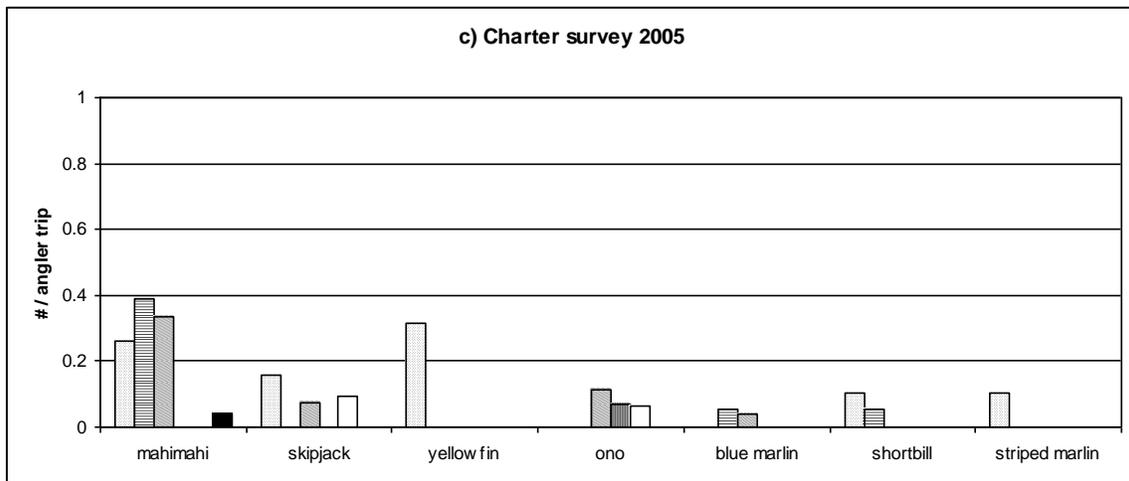
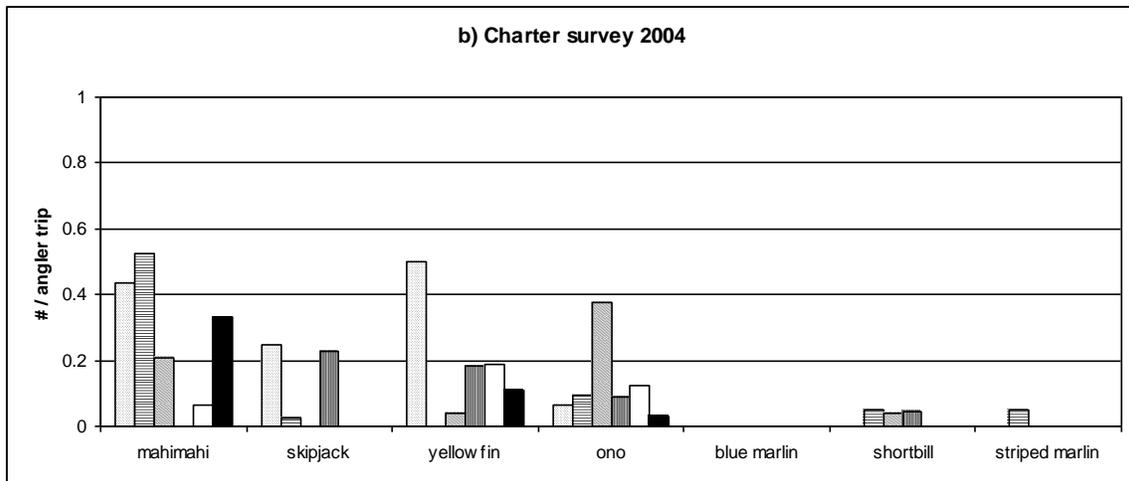
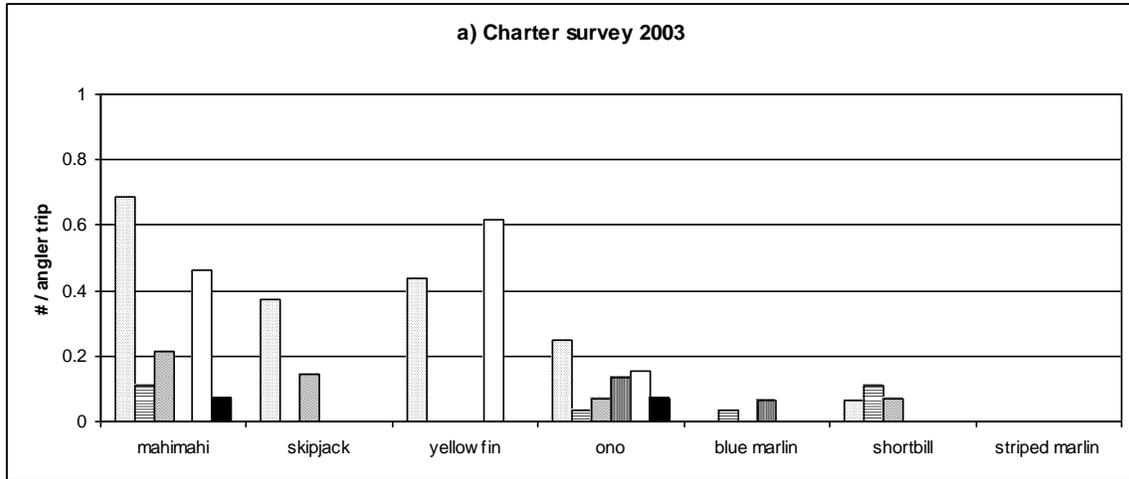
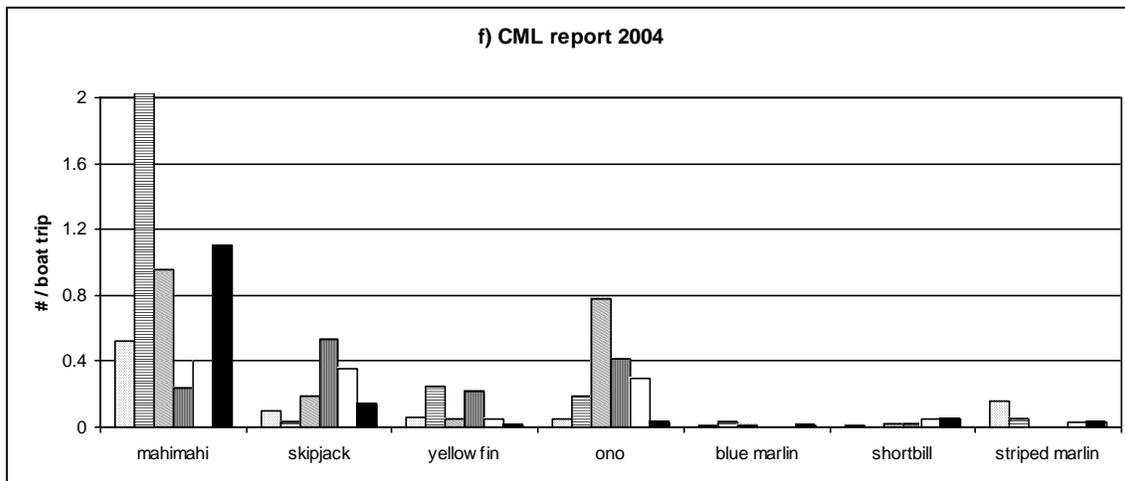
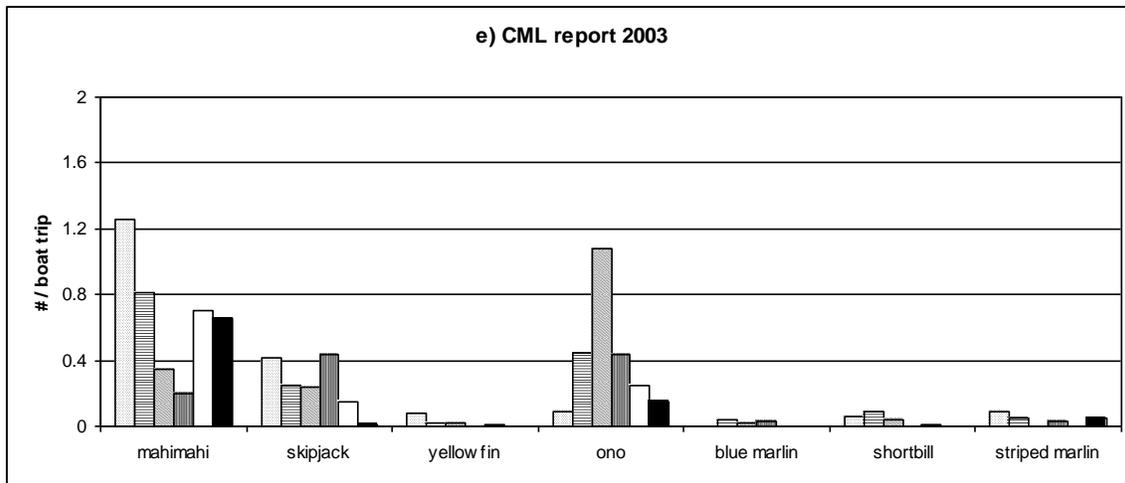
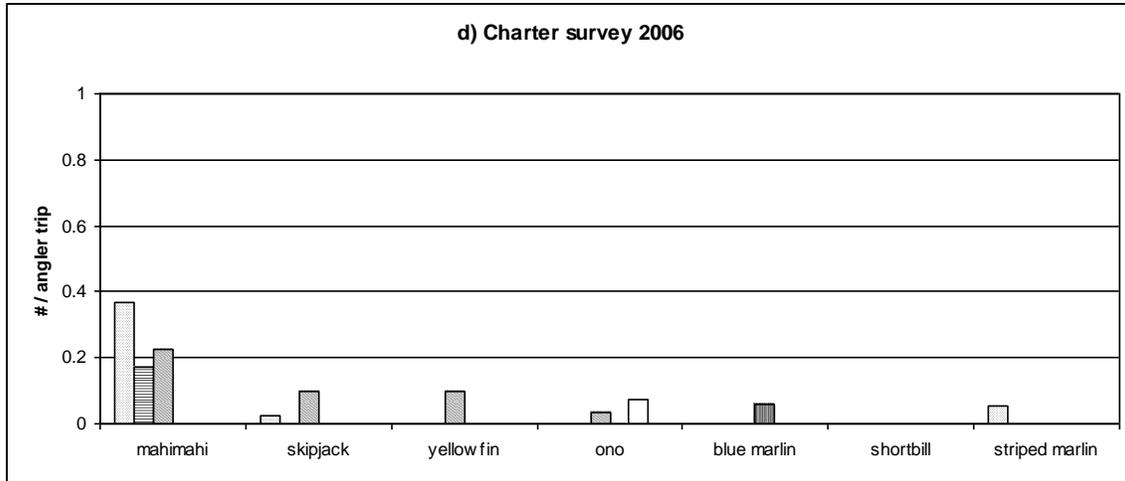


Figure 2a. Catch rate estimates from HMRFs For-Hire survey (a-c) and from CML reports (d-f) at Lahaina Harbor (2003-2005).





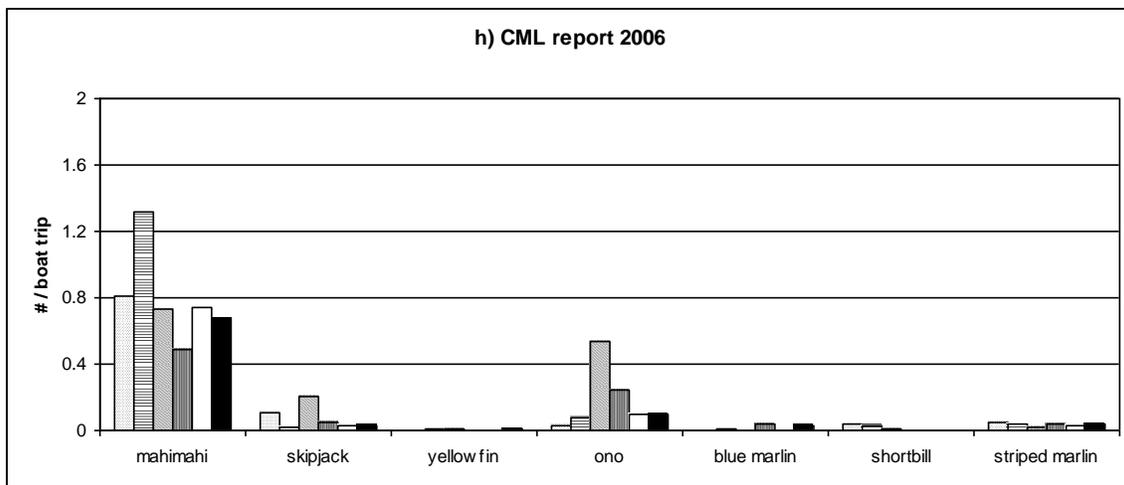
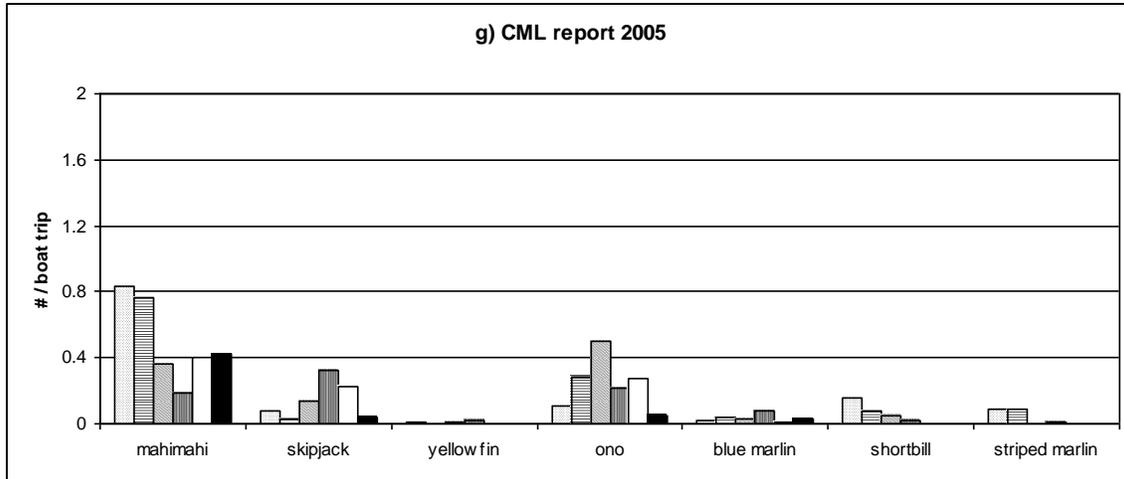
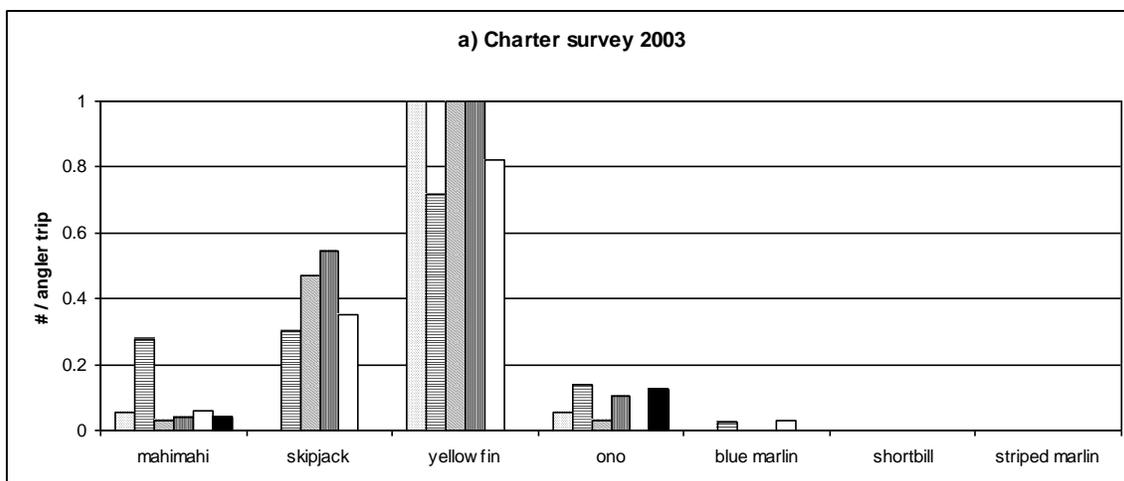


Figure 3a. Catch estimates from HMRFS For-Hire Survey (a-d) and from CML reports (d-h) at Maalaea Harbor (2003-2006).



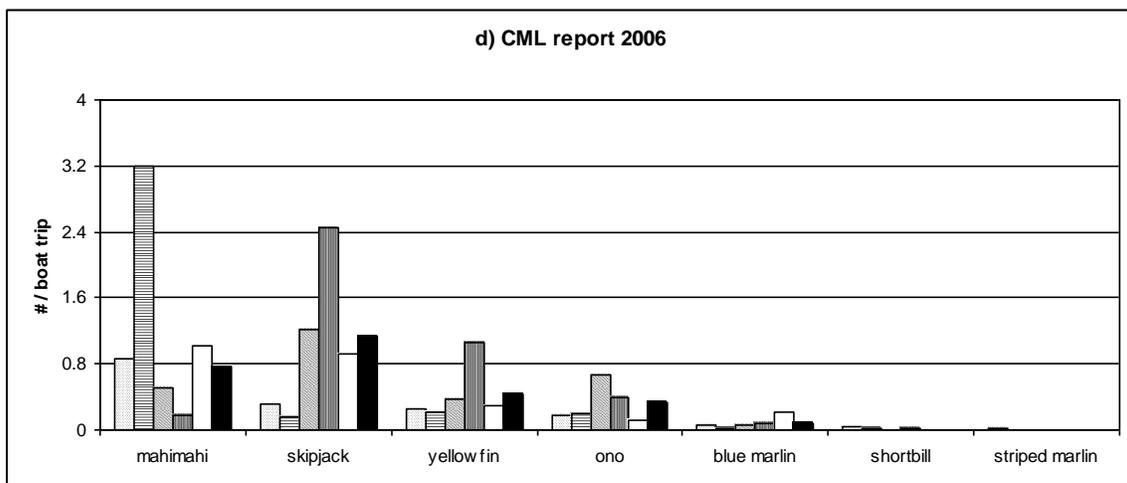
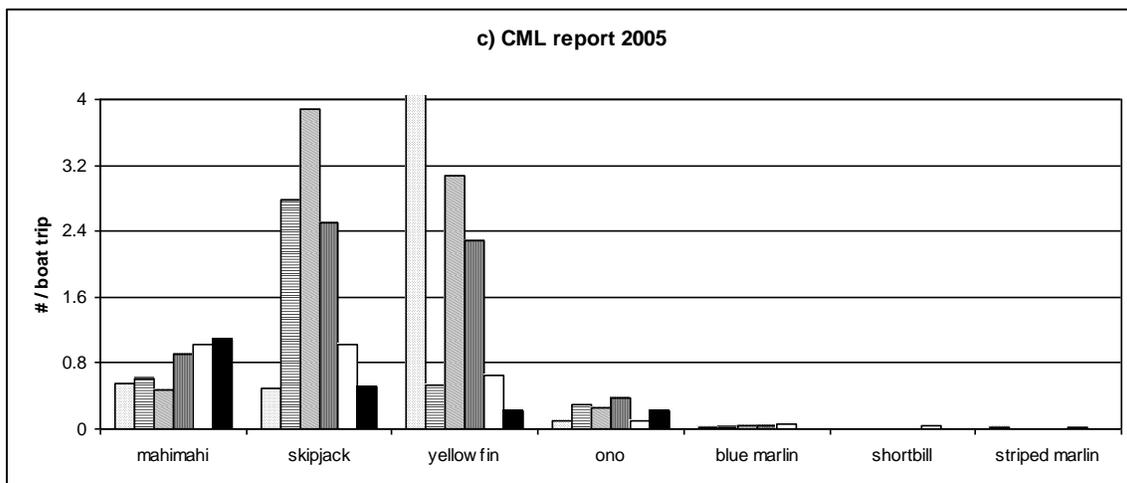
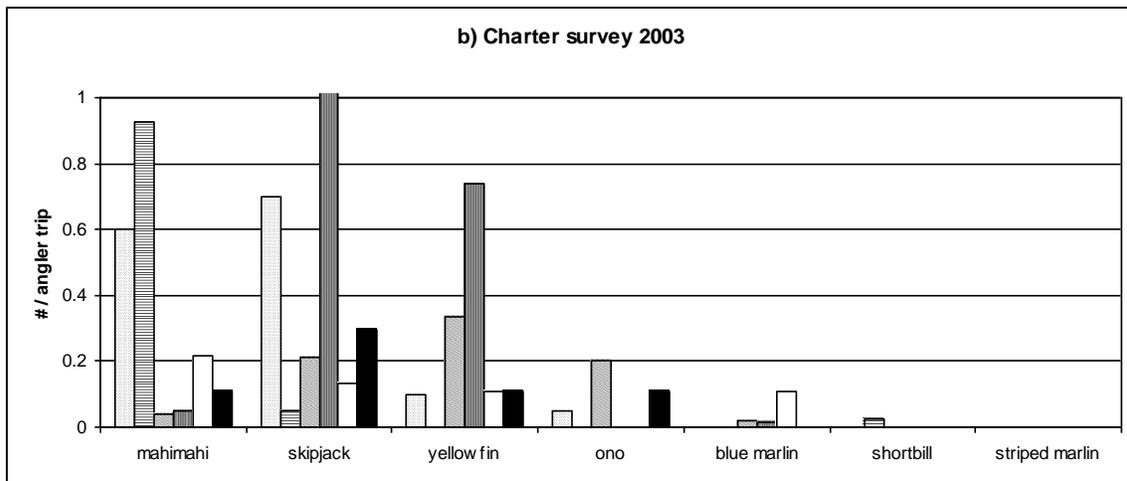


Figure 4a. Catch rate estimates from HMRFS For-Hire survey (a-b) and from CML reports (c-d) at Nawiliwili Harbor (2005-2006).