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Cost-Earnings Study of the American Samoa Longline Fishery Based on Vessel Operations in 2009[1]

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[1] PIFSC Working Paper WP-13-009, Issued 12 July 2013
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ABSTRACT

The purpose of this study was to update the cost-earnings information for the longline fishing fleet based in American Samoa and to examine the economic health of the fleet. An in-person survey was conducted in 2010 to collect cost information from the fleet, focusing on the 2009 operating year. This cost-earnings analysis uses both primary and secondary sources of data to provide baseline information needed to support fishery management. This study found that in 2009, the majority of boats suffered net losses from longline operations. Rising fuel costs, which accounted for approximately 27% of total expenditures, coupled with relatively low revenues (due to lower albacore CPUE), were the major factors leading to poor economic performance. Due to the use of foreign nationals (as opposed to U.S. nationals) as crew members, overall crew compensation was relatively low and accounted for 11% of total expenditures. Compared to unprofitable vessels, profitable vessels were found to generate significantly higher annual revenues while expending less on variable inputs but more on fixed inputs. Results of the study were compared to those of a previous (2001) cost-earnings study of the same fleet, although the results may not be directly comparable due to different sampling methodologies and assumptions.

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INTRODUCTION AND FLEET BACKGROUND

The purpose of this study was to collect cost-earnings information for the longline fishing fleet based in American Samoa. The objectives of the analysis were to examine the economic health of the fleet and assess vessel operations and activities relevant to economic returns to individual vessels and the fleet as a whole. This information is required by the Magnuson-Stevens Fishery Conservation and Management Act to allow fisheries managers to consider potential economic impacts of future regulations.

In 2001, O'Malley and Pooley (2002) conducted a similar cost/earnings study of the American Samoa-based longline fishery. Their study found that the majority of vessels were profitable, generating revenue sufficient to meet expenses. This study serves to update the assessment of overall fleet economic performance and to assess how the economic performance of the fleet has changed. This analysis uses both primary and secondary sources of data on fleet operations in 2009 to provide baseline information needed to support fishery management. Cost data were collected through in-person interviews during the summer 2010 (survey form is presented in the Appendix), while other data were provided by Western Pacific Fisheries Information Network (WPacFIN), National Marine Fisheries Service (NMFS), Pacific Islands Fisheries Science Center (PIFSC).

In 2009, 26 boats were active in the American Samoa longline fleet: one was Class A (≤ 40 feet), five were Class C (50-70 feet), and 20 were Class D (≥70 feet). Class A vessels are outboard-engine-powered catamarans, called *alias*. These boats are generally less than 30 ft in overall length, take 1-3 day trips, have no or limited modern technology, and generally fish less than 350 hooks per set. Fishing by these boats is significantly different from that by the large vessels.

RESEARCH METHODOLOGY AND DATA SOURCES

During July-August 2010, in-person interviews with owners and/or captains of American Samoa longline vessels were conducted in Pago Pago, American Samoa. Survey administrators attempted to collect information from every active vessel. Survey questions elicited variable costs (costs incurred when the vessel actively fishes) and fixed costs (costs incurred regardless of the number of trips the vessel takes) as well as vessel characteristics, owner/operator

demographics, comments and preferences about future management alternatives. Commercial fishing industry members were also interviewed, and they provided pertinent ancillary information for the longline fleet.

Survey administrators obtained complete survey responses from a total of 23 vessels (3 Class C vessels; 20 Class D vessels), which represented a survey response rate of 88%. All the large vessels (Class D) were interviewed (Table 1).[2]

Table 1. Number of active vessels and surveyed vessels, by size class and sample size

Number of Vessels	Class A (≤ 40 ft)	Class B (40-50 ft)	Class C (50-70 ft)	Class D (≥70 ft)
Active	1	0	5	20
Surveyed	0	0	3	20

We contacted the owners and scheduled interviews with the assistance of the Pacific Islands Regional Office observer program located in Pago Pago. Usually, the owner of a vessel was interviewed. Each individual owner (or other representative) was asked for data on three types of costs: variable costs, fixed costs, and labor costs.

- Variable costs were collected on a trip basis: payments for fuel, bait, gear, and provisions were common trip costs. During the interview, vessel owners/captains were asked about trip expenditures for a typical trip for their vessel(s) in 2009. The total annual variable costs were calculated by multiplying the typical trip expenditure estimate by the number of trips taken by the vessel in 2009.
- Fixed costs were collected on an annual basis: payments for mooring fees, bookkeeping fees, insurance, loan payment, and dry dock/major repair costs were common fixed costs.
- Labor cost were collected on a trip basis: During the interview, vessel owners/captains were asked about captain compensation, crew payments (flat rate, crew share, bonuses) and labor expenditures for a typical trip for their vessel(s) in

[2] One of these boats was approached for an interview but was unwilling to participate in the study.

2009. The total annual labor cost was calculated by multiplying the typical trip labor cost by the number of trips taken by the vessel in 2009.

Specific cost information that was missing from individual vessels (less than 5% of the vessels), either because of incomplete interviews or values outside reasonable ranges, was assumed to be equal to the average costs for similar vessels. All cost information in this study was provided by fishermen during interviews and only those fishermen/vessels were included in the cost and earnings estimates.

Data on landings, revenue, and fishing activities by individual vessels in the analysis were mainly obtained from WPacFIN. Longline vessels are required to submit logs of their daily catch and fishing effort for each fishing trip to PIFSC. WPacFIN compiled logbook data and other information such as prices by species to generate revenue information. Revenue data were provided by WPacFIN on a trip basis. Thus, the total annual revenue of each individual vessel was the sum of the revenue of all the trips landed.

SUMMARY STATISTICS AND TRENDS IN THE AMERICAN SAMOA LONGLINE FISHERY

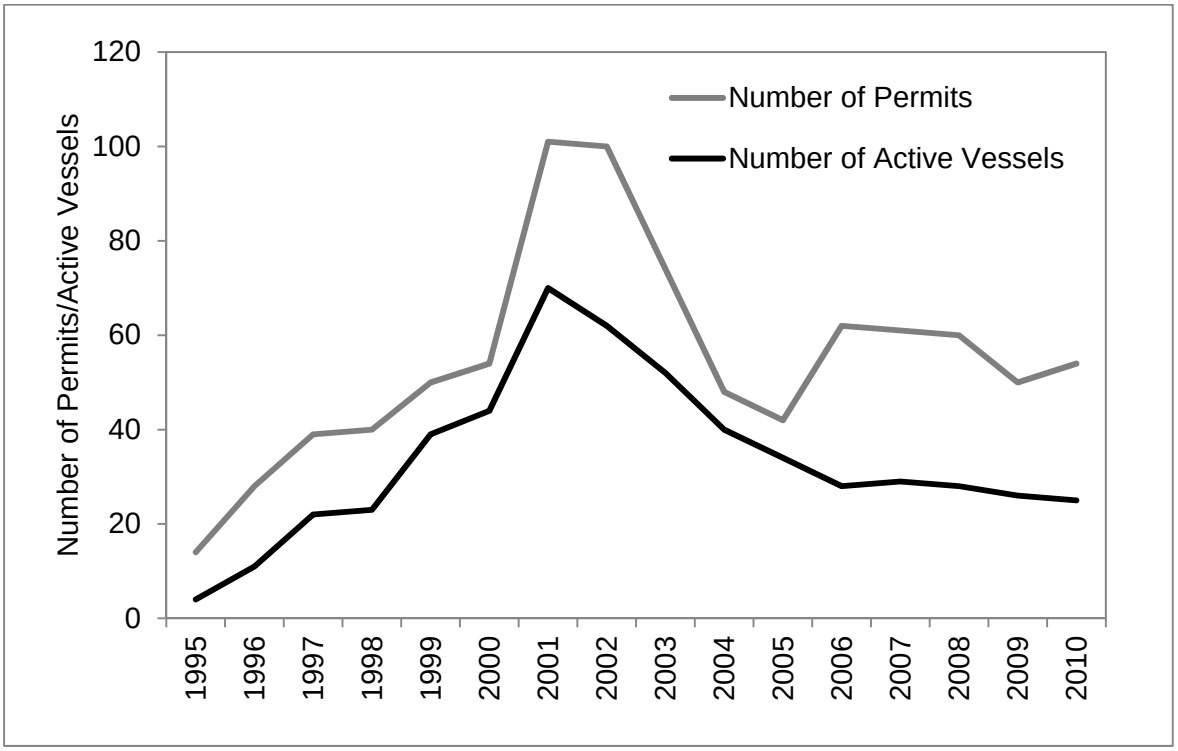
Fleet Composition and Trends

A permit is required for any longline fishing in American Samoa. However, there was no limited entry program until May 2005 when a limited entry program with a maximum of 60 permits was implemented in the American Samoa longline fishery. The 60 permits are distributed among 4 vessel size classes: 22 in Class A, five in Class B, 12 in Class C, and 21 in Class D. Permits are issued by vessel size class and permit holders are restricted to using vessels within their size class or smaller (Federal Register 2009).

Figure 1 presents the number of permits issued and active vessels over the past 15 years. Overall participation of active vessels in the fishery peaked in 2001, slowly declined until 2006, and stabilized thereafter. Most of the participation decline in the early 2000s was due to the exiting of Class A vessels (vessels less than 40 feet in length (Figure 2). The number of Class A vessels (*alias*) peaked in 2000 and 2001 with 37 vessels actively fishing. Since then, the number of *alias* has declined rapidly and only one *alia* has been active in recent years (2008-2010). As

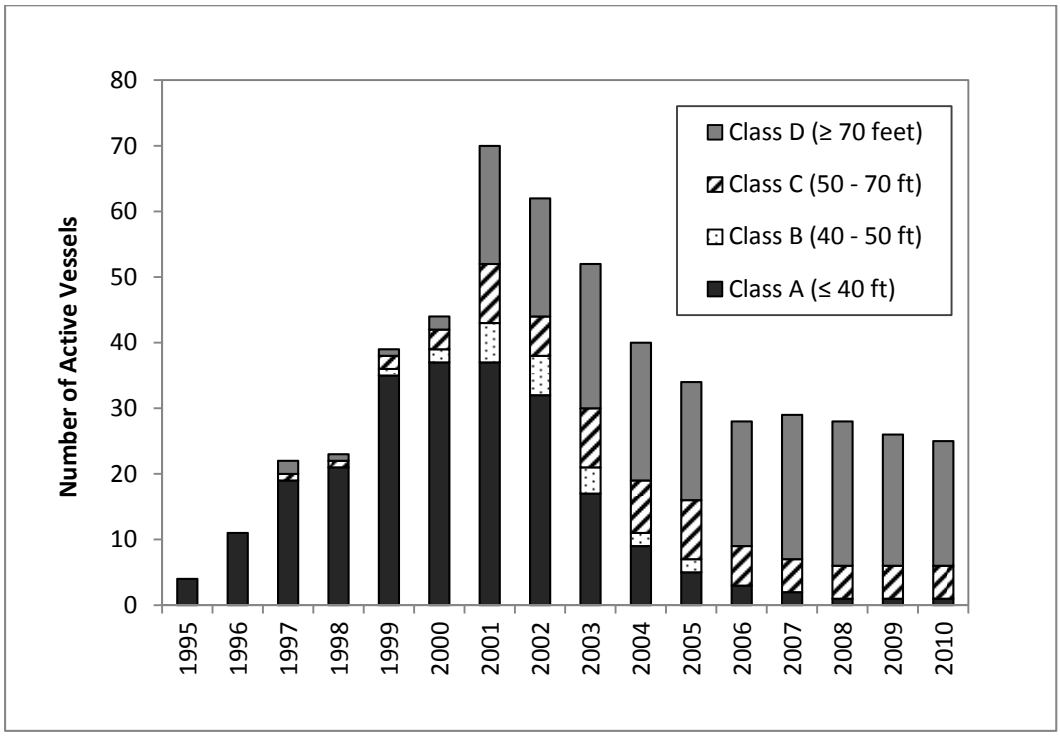
such, the current fleet primarily consists of larger sized vessels. In 2009, 50 permits were issued of which 26 were associated with active vessels.

Figure 1: Number of Permits and Active Vessels, 1995-2010



Data source: National Marine Fisheries Service (NMFS), Pacific Islands Fisheries Science Center: http://www.pifsc.noaa.gov/wpacfin/as/Pages/as_data_6.php (Last Updated 10/04/2011)

Figure 2: Number of Active Longline Vessels by Size Class, 1995-2010



Data source: National Marine Fisheries Service (NMFS), Pacific Islands Fisheries Science Center: http://www.pifsc.noaa.gov/wpacfin/as/Pages/as_data_6.php (Last updated 10/04/2011)

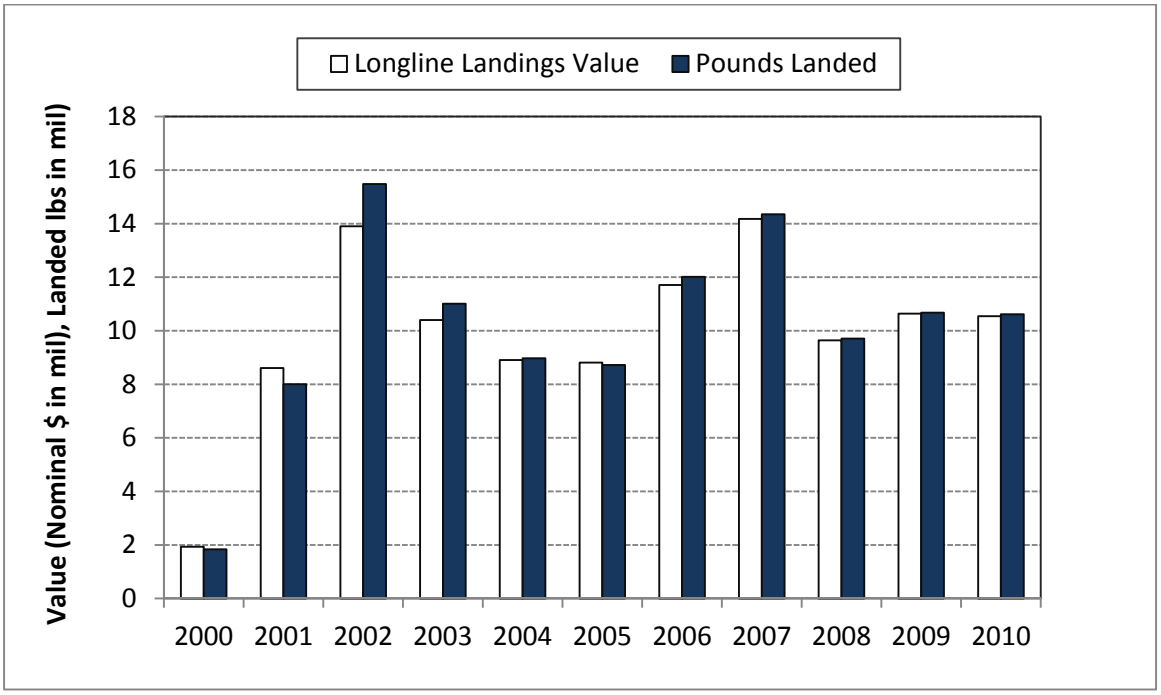
Landings and Revenue Trends

The longline fishery accounts for up to 99% of the commercial revenue and landings in American Samoa fisheries. The main species landed has been albacore, which has historically comprised more than 80% of total landings. Other landings have included yellowfin, bigeye, and skipjack tunas, and a small amount of non-tuna pelagic species such as wahoo, mahimahi, blue marlin, and swordfish. In 2009 (the operating year that we study in this analysis), the longline fishery landed 10.5 million pounds of pelagic fishes, valued at US$10.4 million, slightly higher than the value in 2008 and 2010.

Figure 3 presents total longline landings and value during 2000-2010. Landings follow a bimodal distribution during that time, i.e., there are two peak landings years. A first peak occurred in 2002, with the fleet generating landings of 15.5 million pounds valued at $13.9 million; the second occurred in 2007, with total landings of 14.4 million pounds valued at $14.7 million. Before 2001, commercial landings and revenue in the longline fishery were less than $2

million and the primary source of landings was the smaller sized vessel class. In 2001, when the number of large vessels (vessels over 70 feet in length) in the fleet increased from 2 to 18, the landings were four times greater than the previous year.

Figure 3: Longline Landings Value and Pounds Landed (2000-2010)

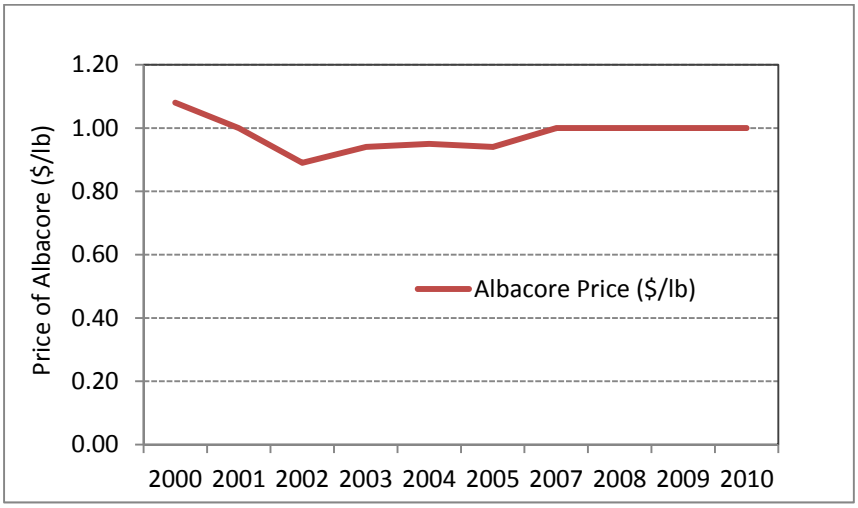


Data source: Western Pacific Regional Fisheries Management Council, Pelagic Fisheries of the Western Pacific Annual Report, 2000-2010
http://www.wpcouncil.org/pelagic/Documents/AnnualReports

As shown in Figure 4, during 2000-2010, the price of albacore was relatively stable at approximately $1 per pound (WPRFMC, 2000-2010). The only variation was a slight decline during 2002-2005.[3]

[3] Fish prices are obtained from Western Pacific Fisheries Information Network (WPacFIN), National Marine Fisheries Service (NMFS), Pacific Islands Fisheries Science Center. Because there are limited buyers for the fish landed, price data are typically highly confidential between fishermen and buyers. As such, the prices presented are estimates.

Figure 4: Albacore Price per Pound (Nominal $), 2000-2010



Data source: Western Pacific Regional Fisheries Management Council, Pelagic Fisheries of the Western Pacific Annual Report, 2000-2010, http://www.wpcouncil.org/pelagic/Documents/AnnualReports

RESULTS FROM THE IN-PERSON SURVEY

Vessel Characteristics

All vessels surveyed in this study were large (Classes C and D) longline vessels. Specific physical and operational characteristics of vessels are presented in Table 2. The average original vessel purchase price plus any additional longline equipment was $398,167 per vessel. The average vessel age is 20.5 years and the average vessel length is 78.5 feet. The average fuel capacity is approximately 13,455 gallons, and the average hold capacity is 107,091 lbs.

Table 2. Physical and Operational Characteristics of Surveyed Class C & D Longline Vessels (N=23) Based in American Samoa.

Physical Characteristics	Mean	Median	Min	Max
vessel purchase price	389,167	362,500	100,000	800,000
fuel capacity (gal)	13,455	12,000	3,000	32,000
vessel age (yr)	21	19	10	30
vessel length (ft)	79	78	57	99
vessel width (ft)	22	22	16	25
maximum speed (knots)	8	9	5	11
average speed (knots)	7	7	4	9
fish holding capacity (lbs)	107,091	88,500	32,000	270,000
engine horsepower	451	450	135	720

Data source: in-person survey conducted by PIFSC

Fleet-Wide Cost-Earnings Analysis

Table 3 reports the cost-earnings estimates for the longline fleet operating in American Samoa. Based on the 23 vessels surveyed, the total average annual costs per vessel were $442,438, which includes variable costs (trip expenditures), fixed costs, and labor costs. Vessel depreciation cost was not included in the analysis. The average annual revenue per vessel was $448,817, just slightly higher than total expenditures; as a result, the average annual return (profit) per vessel is $6,379. This implies that the average annual return on investment (profit divided by the initial purchase price of vessel) was 1.6%. However, there was great variation among vessels; the standard deviation in vessel profit was 10 times greater than the mean.

In contrast to the small return described in this study, the 2001 cost-earnings study on the same fleet by O'Malley and Pooley (2002) reported a significantly larger positive fleet-wide profit. In the later sections of this report, we will present the detailed cost structure of the current fleet, the economic characteristics between profitable vs. un-profitable vessels in the current fleet, and also compare the 2001 and 2009 periods.

Table 3. Cost-Earnings of the 2009 American Samoa Longline Fleet (n=23 vessels)

	Mean	*Standard Deviation*	*Min*	*Max*
Vessel Information				
Vessel Length	79	12	57	99
Vessel Width	21	2	16	25
Number of Total Trips	6	2	2	9
Number of Total Trip Days	45	20	7	107
Vessel Purchasing Price	389,167	187,456	100,000	800,000
Number of Crew	7	1	5	8
# foreign	5	1	4	6
Annual Revenue per Vessel	448,817	175,371	62,602	760,851
Annual Variable Costs per Vessel	268,016	122,624	70,179	662,200
Fuel Costs	121,648	71,257	22,500	378,000
Oil Costs	6,064	2,757	2,588	13,500
Freezer Costs	8,389	28,330	0	140,000
Bait Costs	53,312	20,059	12,591	97,500
Provisions	20,109	9,170	6,000	37,500
Communication	3,846	5,165	0	24,000
Fishing Gear Costs	22,843	11,584	5,000	52,000
Misc. Trip Costs	31,804	37,447	0	153,000
Annual Labor Costs per Vessel	78,167	59,843	10,476	222,040
Total Capt Share	30,594	24,771	0	104,700
Total Crew Payments	47,573	37,199	11,560	117,340
Total Flat Rate	3,132	5,890	0	21,600
Total Crew Share	36,238	31,834	2,923	98,388
Total Bonus	209	0	0	1,200
Total Initial Payments	7,995	5,935	0	18,200
Annual Fixed Costs per Vessel	96,256	40,703	38,646	161,481
Mooring	3,365	763	2,000	5,000
Bookkeeping	3,467	2,576	1,000	11,000
Insurance	24,970	19,996	0	60,000
Loan Payments	19,251	26,417	0	75,000
Other Fixed Costs	3,413	4,856	0	15,000
Dry Dock Costs	16,541	8,947	0	37,500
Overhaul Costs	5,584	3,694	0	19,333
Major Repairs	10,761	22,230	0	101,000
Routine repairs	8,904	10,424	0	40,000
Total Expenditures	442,438	154,886	173,569	777,777
Cash Return	6,379	77,003	(158,259)	141,801

Data source: in-person survey conducted by PIFSC

Variable costs (trip expenditures) accounted for approximately 60% of total average annual costs. Labor and fixed costs accounted for 18% and 22% of total costs, respectively. All variable trip costs were reported on an average trip basis during the in-person survey and were annualized by multiplying the cost per trip by the number of trips the vessel made during the year according to federal logbooks. Annual repairs, although somewhat dependent on the number of trips, were considered fixed costs. Major repair costs included upkeep of freezers, vessel/hull, pipes, longline spool, generator, and other equipment. Dry dock costs may include repair/replacement of the propeller and shaft and painting and sandblasting costs. Since these costs are not incurred every year, annual costs are calculated by dividing the cost of the most recent expense by the typical interval (years) between two service instances. Daily maintenance costs include minor engine repair; spot painting; and replacement of hoses, wire traces, longline, branchline and hooks. Depreciation was not taken into consideration as a fixed cost because if a vessel is adequately maintained, its useful life is virtually unlimited (Hamilton et al., 1994).

Table 4 shows the breakdown of costs by specific inputs. Fuel was the single largest cost, representing approximately 27% of total annual average expenditures or 45% of total annual average variable costs. Bait was the second highest expenditure, representing 12% of total annual average expenditures or 20% of total annual average variable costs (trip expenditures).

Table 4. Input Costs as a Percent of Total Vessel Expenditures for the 2009 American Samoa Longline Fishery

Input	% of Total Annual Average Expenditures per Vessel
Annual Average Variable Costs per Vessel	**60%**
Fuel	27%
Oil	1%
Freezer Operation	2%
Bait	12%
Provisions	5%
Communication	1%
Fishing Gear	5%
Misc. Trip Costs	7%
Annual Average Labor Costs per Vessel	**18%**
Total Captain Share	7%
Total Crew Payments	11%
Total Flat Rate	1%
Total Crew Share	8%
Total Bonus	0%
Total Initial Payments	2%
Annual Average Fixed Costs per Vessel	**22%**
Mooring	1%
Bookkeeping	1%
Insurance	6%
Loan Payments	4%
Other Fixed Costs	1%
Dry Dock Costs	4%
Overhaul Costs	1%
Major Repairs	2%
Routine repairs	2%

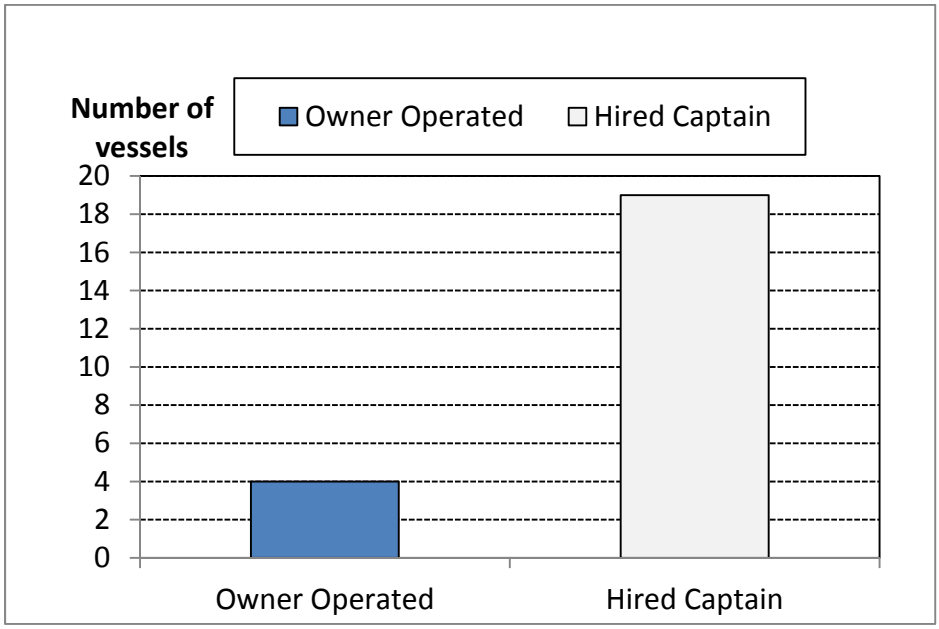
Data source: in-person survey conducted by PIFSC

Operator and Labor Costs

Vessel owners primarily contracted captains to operate their vessels. Of the 23 boats surveyed, 4 were owner-operated with the remaining 19 employing captains (Figure 5). These captains were usually compensated by shares of net trip revenue (trip revenue minus trip expenditures). The average captain share was approximately 17% of the annual net revenue or $30,594 per year. Payment to captains accounted for approximately 7% of total annual costs, or 39% of total annual labor costs.

Longline vessels employed an average of 6.5 (range 6-7) crew members. The vast majority of crew members employed were from foreign countries (approximately 5 per boat, or 80% of all crew members). These crew members were primarily from the Philippines, with Samoa, Tonga, Vanuatu, China, and other countries also represented. These crew members were compensated through different payment schemes that primarily consisted of crew shares, with flat rate payments used to a much lesser degree. In addition to salary, other expenses associated with hiring foreign crew included agency and immigration fees, airfare, and supplying the necessary fishing and personnel gear for each crewmember. These costs accounted for approximately 16.8% of average annual crew costs. The average total annual crew payments (flat rate, shares, bonuses, and initial payments) were $47,573 per vessel, which was 11% of total average annual costs, or 61% of average annual labor costs. Average annual payment to each crew member was $7,294. The use of foreign crew members serves to keep the overall labor expense lower.[4]

Figure 5. Composition of Vessel Operators in the 2009 American Samoa Longline Fishery



Data source: in-person survey conducted by PIFSC

[4] There has been a steady rise in foreign crewmembers for the American Samoa longline sector. In 2000, it was estimated that approximately half the vessels employed foreign crew (O'Malley and Pooley 2001). In 2005 over 80% of the vessels employed foreign crew. The willingness of foreign crewmembers to accept less compensation for work has allowed vessels to dramatically reduce their overall labor costs.

Profitable vs. Unprofitable Vessels

Considerable variability in income to fishery participants was caused by variations in revenue and costs among vessels. Of the 23 vessels surveyed, only 52% (12 vessels) were able to make a net gain (earn a profit). Table 5 compares the vessel characteristics and Table 6 compares the vessel cost earnings performance of vessels that made a net gain and vessels that suffered a net loss. The average annual profit of the 12 profitable vessels was $64,192 per vessel, representing a 13% return on investment (profit divided by vessel initial purchase price). The average annual net loss of the 11 unprofitable vessels was $56,690 per vessel. Assessing the physical characteristics of profitable vs. unprofitable vessels, we can see that profitable vessels featured significantly higher purchase prices. The average cost of a profitable vessel was approximately 93% more than the average unprofitable vessel. We also find that profitable vessels have greater fuel capacity (15,318 lbs. vs. 11,591 lbs.), are longer (81 ft vs. 76 ft), and have greater hold capacity (126,727 lbs. vs. 87,455 lbs.). Furthermore, profitable vessels are also faster and have higher horsepower than unprofitable vessels. However, there was no large difference in vessel age between these two groups.

Comparing the cost earnings performance of profitable to unprofitable vessels, the analysis indicated that profitable vessels generate substantially greater revenue ($515,792 vs. $375,754), or 37% greater revenue than unprofitable vessels, while spending 11% more per trip and on fixed costs. Due to the nature of the cannery market where most landings are sold, there was little variation in ex-vessel prices paid to vessels. Since the total annual days at sea for these two groups were similar, the catch per day (at sea) apparently was the essential element that affected the economic performance of these two vessel groups. Despite earning significantly higher revenues, profitable vessels expend approximately the same total annual costs if labor costs are included. We find that the higher labor expenditures of the profitable vessels stem from mainly higher earned production shares. In other words, the captain and crew in the profitable vessels received much higher pay than those who worked on the unprofitable vessels because their profit shares were greater in absolute terms. This analysis suggests that profitable vessels are significantly more efficient at catching fish, and thus can generate more revenue with equivalent economic inputs.

Table 5. Physical and Operational Characteristics of Profitable and Unprofitable Vessels in the 2009 American Samoa Longline Fishery

Vessel Physical Characteristics	*Profitable Vessels* (*n=12*) (mean)	*Unprofitable Vessels* (*n=11*) (mean)
Purchase price	495,000	256,875
Current appraisal value	709,375	408,000
Replacement value	1,200,000	778,889
Startup costs	337,500	141,429
Fuel capacity (gal)	15,318	11,591
Age (yr)	20	19
Length (ft)	81	76
Width (ft)	21	22
Maximum speed (knots)	9	8
Average speed (knots)	7	6
Hold capacity (lbs)	126,727	87,455
Horsepower engine	469	435

Data source: in-person survey conducted by PIFSC

Table 6. Comparison Between Profitable and Unprofitable Vessels in the 2009 American Samoa Longline Fishery

	Average for Profitable Vessels (n=12)	Average for Unprofitable Vessels (n=11)
Vessel Information		
Length (ft)	81	76
Width (ft)	21	22
Total Trips	6	6
Purchase Price	495,000	256,875
Total Number of Crew	7	6
Number of Foreign Crew	5	5
Annual Revenue Per Vessel	515,792	375,754
Annual Trip Costs per Vessel	253,620	283,721
Fuel	112,338	131,805
Oil	6,388	5,711
Freezer Operations	1,225	16,205
Bait	55,598	50,819
Provisions	21,688	18,386
Communication	5,196	2,373
Fishing Gear	25,750	19,673
Misc. Trip Costs	25,438	38,750
Annual Labor Costs per Vessel	107,223	46,468
Total Captain Share	40,446	19,846
Total Crew Payments	66,777	26,623
Total Flat Rate	2,142	4,211
Total Crew Share	54,243	16,595
Total Bonus	100	327
Total Initial Payments	10,292	5,489
Annual Fixed Costs per Vessel	90,757	102,254
Mooring	3,405	3,321
Bookkeeping	3,206	3,752
Insurance	33,958	15,164
Loan Payments	10,314	29,001
Other Fixed Costs	5,200	1,464
Dry Dock Costs	16,344	16,756
Overhaul Costs	4,847	6,389
Major Repairs	4,083	18,045
Routine repairs	9,400	8,364
Annual Total Expenditures per Vessel	451,600	432,444
Annual Profit per Vessel	64,192	(56,690)

Data source: in-person survey conducted in this study

Comparison with 2001 Cost Earnings Study

Table 7 compares the economic performance of vessels in American Samoa to results from a 2001cost earnings study of the same fishery (O'Malley and Pooley, 2002). It is important to note that the O'Malley and Pooley (2002) study estimated revenue based on a subsample of longline vessels which may not have been a representative sample of all vessel activity.[5] O'Malley and Pooley (2002) indicated that the revenue may be overestimated because, during the study period, the majority of vessels arrived in midyear. Albacore are more abundant from May to October in American Samoa's waters (Domokos et. al. 2007), hence catch-per-unit-effort (CPUE) is higher while fishing is absent from January to April. O'Malley and Pooley's (2002) estimate of annual revenue, based on CPUE from May to December, could be higher than the actual full-year CPUE. In contrast, the revenue data used to evaluate the fishery's 2009 economic performance in this study was based upon a full year of logbook data for each vessel in the surveyed sample, reflecting a more accurate depiction of vessel performance. As a result of these methodological differences, our ability to meaningfully compare between the two studies is limited.

[5] In the 2001 study, activity from 3 vessels was used to extrapolate for the rest of the fleet.

Table 7. Comparison of Cost-Earnings Performance in 2001 and 2009 in the American Samoa Longline Fishery

	2009	2001	% Change
Average Annual Revenue per Vessel	448,817	657,063	-32%
Average Annual Trip Costs per Vessel	268,016	200,923	33%
Fuel	121,648	73,314	66%
Oil	6,064	5,085	19%
Freezer Operations	8,389	10,090	-17%
Bait	53,312	60,318	-12%
Provisions	20,109	22,739	-12%
Communication	3,846	n/a	
Fishing Gear	22,843	29,378	-22%
Misc. Trip Costs	31,804	n/a	
Average Annual Labor Costs per Vessel	78,167	177,894	-56%
Total Captain Share	30,594	68,421	-55%
Total Crew Payments	47,573	109,474	-57%
Total Flat Rate	3,132	n/a	
Total Crew Share	36,238	n/a	
Total Bonus	209	n/a	
Total Initial Payments	7,995	n/a	
Average Annual Fixed Costs per Vessel	96,256	101,039	-5%
Mooring	3,365	6,480	-48%
Bookkeeping	3,467	1,609	115%
Insurance	24,970	26,533	-6%
Loan Payments	19,251	35,578	-46%
Other Fixed Costs	3,413	8,180	-58%
Dry Dock Costs	16,541	4,077	306%
Overhaul Costs	5,584	1,558	258%
Major Repairs	10,761	3,333	223%
Routine repairs	8,904	13,691	-35%
Total Average Annual Expenditures per Vessel	442,438	479,856	-8%
Average Annual Net Return per Vessel	6,379	177,207	-96%

Data source: 2001 data are from O'Malley and Pooley (2002) and 2009 data are from the in-person survey conducted by PIFSC

Table 8. Comparison of Input Costs as a Percent of Total Vessel Expenditures in the American Samoa Longline Fishery, 2009 and 2001

	2009	2001*
Annual Trip Costs	61%	42%
Fuel Costs	27%	15%
Oil Costs	1%	1%
Freezer Costs	2%	2%
Bait Costs	12%	13%
Provisions	5%	5%
Communication	1%	
Fishing Gear Costs	5%	6%
Misc. Trip Costs	7%	
Total Labor Costs	18%	37%
Total Captain's Share	7%	14%
Total Crew Payments	11%	23%
Total Flat Rate	1%	
Total Crew Share	8%	
Total Bonus	0%	
Total Initial Payments	2%	
Fixed Costs	22%	21%
Mooring	1%	1%
Bookkeeping	1%	0%
Insurance	6%	6%
Loan Payments	4%	7%
Other Fixed Costs	1%	2%
Dry Dock Costs	4%	1%
Overhaul Costs	1%	0%
Major Repairs	2%	1%
Routine repairs	2%	3%

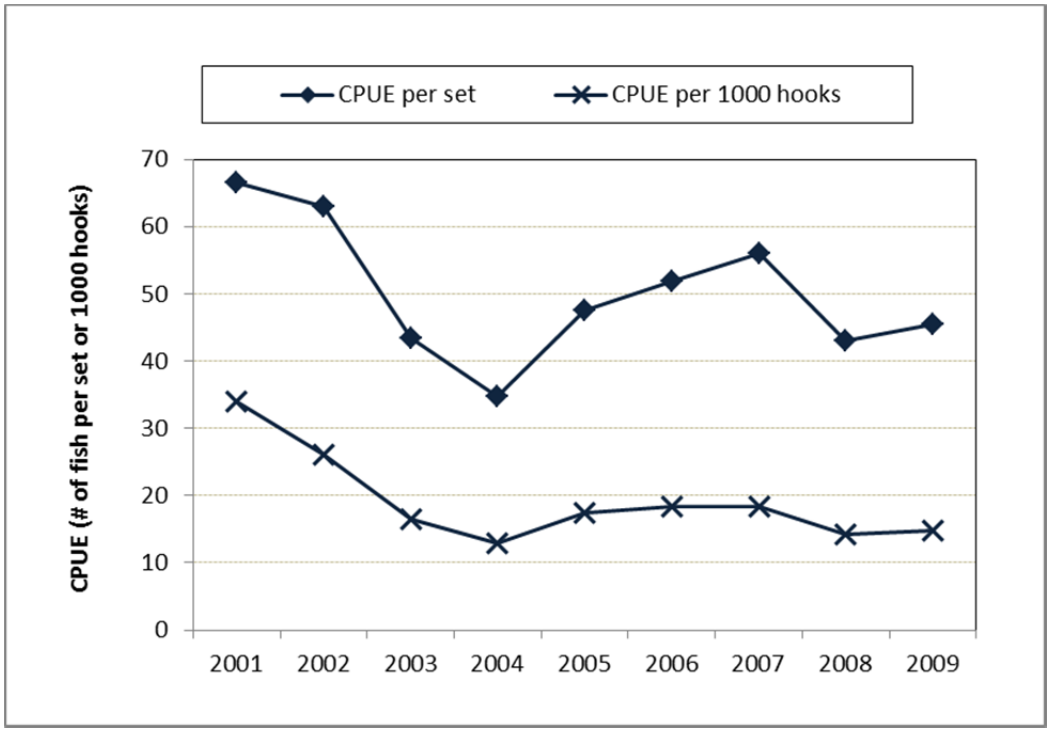
**Data source: ***2001 data are from O'Malley and Pooley (2002) and 2009 data are from the in-person survey conducted in this study

Table 8 compares the expenditure shares (input/total annual expenditures) of selected inputs between the two periods. Comparing the two periods, there are two main changes in cost structure. First, there was a substantial increase in fuel expenditures. The annual average expenditure per vessel on fuel rose by 66%. While fuel costs accounted for 27% of total expenditures in 2009, they accounted for less than 15% in 2001. A second dramatic change was

the decline in labor costs. Annual average crew expenditures per vessel fell by 55%, and the share of total expenditures represented by crew payments fell from 23% in 2001 to 11% in 2009. These changes were likely caused by the wider use of foreign crew members whom were paid at a lower rate (see footnote 3). The lower annual average net revenue per vessel in 2009, due both to lower revenue and higher variable costs, also contributes to lower profit-share payments to crew and captain.

A decline in albacore CPUE was the main factor that contributed to lower revenue in 2009. Albacore was the main component of the catch. In 2009, about 83% of the revenue was composed of albacore landings (WPRFMC 2009). Figure 6 shows the CPUE trend from 2001 to 2009 for American Samoa longline vessels larger than 50 feet. In 2009, CPUE was approximately 14.8 fish per 1000 hooks, which was 56% lower than the 2001 CPUE of 34 fish per 1000 hooks. If we measure CPUE by fish per set (as opposed to fish per hooks), CPUE fell from 66.5 fish per set in 2001 to 45.5 fish per set in 2009, a 32% decline.

Figure 6. Trend in CPUE for Albacore in American Samoa Longline Fleet, 2001-2009



Data source: WPRFMC, Pelagic Fisheries of the Western Pacific Annual Reports, 2000-2010, Honolulu, Hawaii. http://www.wpcouncil.org/pelagic-data.html

Lower ex-vessel fish prices also contributed to the decline in revenue from 2001 to 2009. The price of albacore in the 2001 report was $1.13/lb, which was 13% higher than the 2009 price of $1.00/lb. However, it is unclear whether the difference in the price reflects the actual change of price between the two periods or results from price data being obtained from different sources in the 2009 and 2001 analyses. The price information in the 2001 cost-earnings study (O'Malley and Pooley, 2002) was from the Forum Fisheries Agency (FFA), while the price information for the current study was from PIFSC's WPacFIN program (published in the WPRFMC annual reports). FFA recorded albacore prices from different cannery markets, but the O'Malley and Pooley (2002) study did not specify from which market the price in their study was derived.

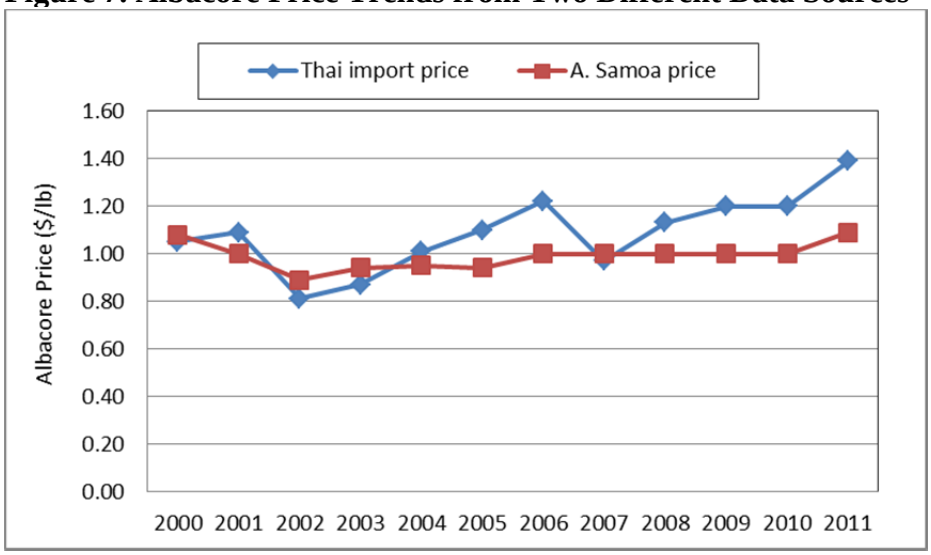
Figure 7 shows the difference of the price information between these two sources (FFA, reporting Thai market data and WPacFIN reporting America Samoa market data). It shows that in the early 2000s (2000-2004), the America Samoa and Thai market prices for albacore had similar trends. However, the price for albacore in America Samoa was much lower than the Thai market price. While O'Malley and Pooley (2002) used $1.13/lb as the 2001 albacore price in their report, the WPacFIN albacore price was only $1.00/lb in 2001. In 2009, FFA reported the albacore price of Thai imports at $1.20/lb , whereas the WPacFIN reported price remained at $1.00/lb in 2009.

These price differences have significant implications for the profitability of the American Samoa longline fleet. In this analysis, the average annual profit per vessel of $6,379 was calculated based on the albacore price $1.00/lb. Alternatively, using FFA data ($1.20/lb), and holding the other elements (costs and price of other landings) constant, the average annual revenue per vessel would be $523,000. This estimate is 17% higher than the revenue per vessel calculated using a price of $1.00/lb. Subtracting the annual average cost per vessel of $470,000, profit per vessel would be approximately $53,000 given a price of $1.20/lb, significantly larger than the current estimate of $6,379 developed using $1.00/lb.

Albacore prices are highly confidential between fishermen and buyers. As such, the price presented in the WPRFMC annual report was based on rough estimation and may not reflect the actual prices (personal communication, WPacFIN). Nonetheless, we decided to use the price reported by WPRFMC annual report, since: 1) it is unclear the extent to which the America

Samoa cannery market price tracks with Thai import market price, and 2) using the American Samoa price would ensure the same data source for price, revenue, and CPUE data.

Figure 7. Albacore Price Trends from Two Different Data Sources



Data sources: Thai market data were reported by FFA. On the internet at <www.ffa.int/catch_value> [Accessed April 21, 2013] and America Samoa market data were reported by WPacFIN, same as Figure 4).

Mindful of the limitations in comparing economic performance between the two studies, we attempt to assess the overall trend over the past decade. We find that over the past ten years, average annual economic return per vessel has declined. The substantial increase in fuel expense was larger than the decline in crew costs, while overall average revenue fell by 32%. While the average vessel generated net revenues (profit) of $177,207 in 2001, after fixed and variable costs (including labor) were deducted, the average vessel in 2009 generated only $6,379 in net revenues (profit).

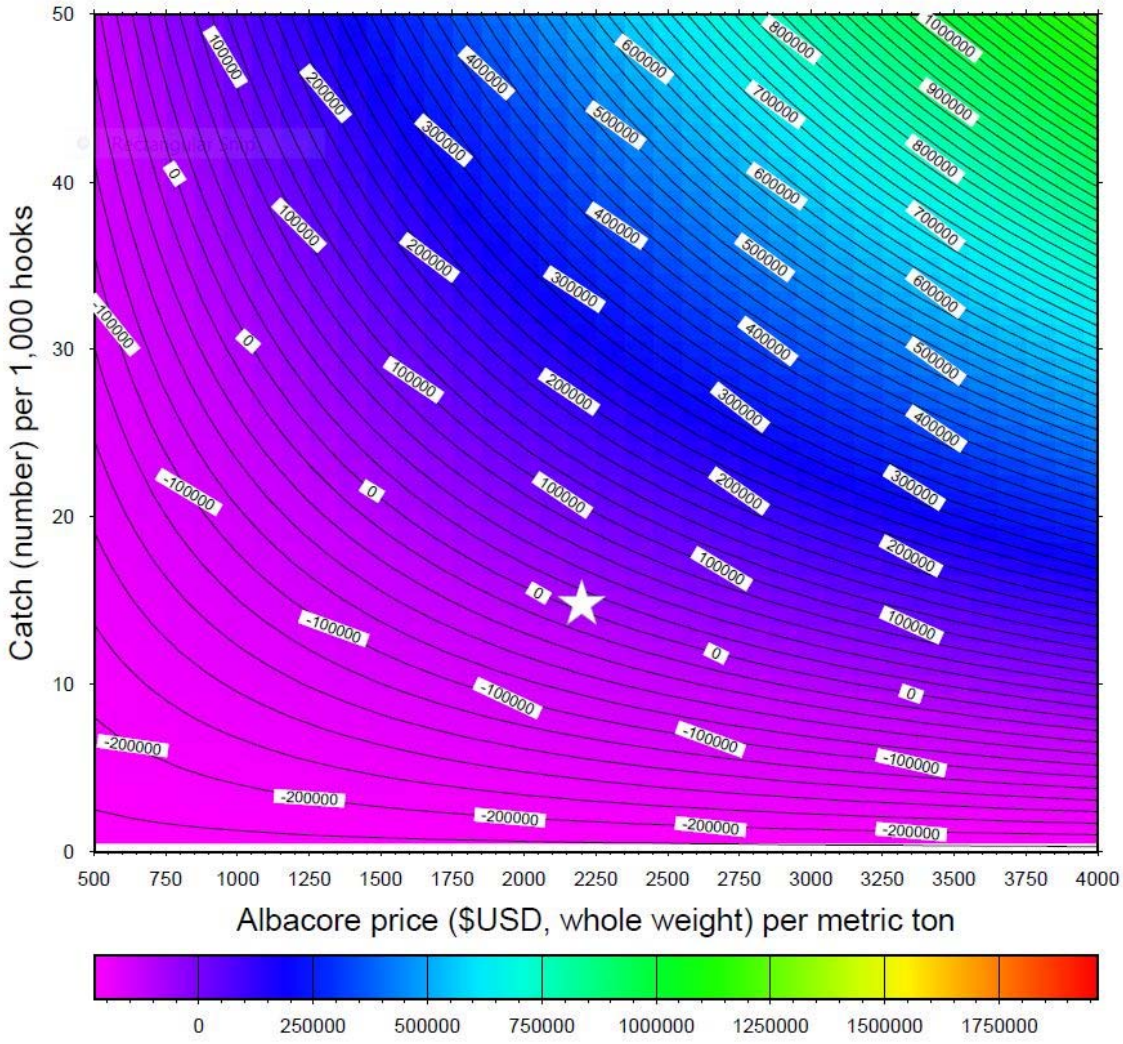
Sensitivity Analysis of Correlation between Albacore Price, CPUE and Profit

As indicated above, albacore price and CPUE play important role in determining profit in the American Samoa longline fleet. We estimated a matrix of CPUE and price to examine how profit correlates to albacore price and CPUE, while keeping others, such as fixed and variable costs, total effort, and non-albacore catches, unchanged. The cost information was presented in Table 3. The average annual fishing effort per vessel was 650,470 hooks and albacore composed

of 83% of the total revenue based on the 2009 operation (WPRFMC 2009). The matrix presents estimated profits given albacore prices ranging from $1,000 to $4,000 per metric ton (which is approximately $0.454/lb to $1.815/lb) and CPUE ranging between 10 to 40 fish per 1000 hooks. Revenue is generated given different CPUE and price level, thus, the profit at each CPUE or price level can be calculated accordingly. The matrix of CPUE, price and profit resulted from the simulation was illustrated in Figure 8.

The graph (Figure 8) indicates that the 2009 profit level, where the star in the graph is located, is quite near to the isocurve of zero profit. The matrix indicates that profit is highly sensitive to small changes in albacore CPUE and price, and that marginal changes in CPUE and albacore price can render vessels unprofitable. If CPUE decreases slightly from 14.8 fish /per 1000 hooks to 14.3 fish /per 1000 hooks , holding CPUE of other species and fish price constant, the profit of an individual vessel would be negative (i.e., a net loss). If the price of albacore price dcelines slightlys, from $1.00/lb to $0.97/lb, assuming no change in thCPUE of all species, the profit would become negative (i.e., a net loss). This suggests that the American Samoa longline fleet operated in a very thin profit margin in 2009.

Figure 8. Isocurves of Profit in Response to the Changes of Albacore CPUE and Price in the American Samoa Longline Fishery



Data Source: The data of the isocurves were developed by the cost-earnings table (Table 3). The graph of isocurves was estimated by Keith Bigelow (PIFSC).

CONCLUSION

In 2009, the 26 active longline vessels in the American Samoa longline fleet generated $10.6 million in revenue. This study collected cost earnings data on 23 of these vessels for the 2009 operating year to update baseline economic information associated with operating these boats. We found that the average vessel generated an annual net return (profit) of $6,379 to the

vessel owner. Fuel costs, which accounted for approximately 27% of total average annual expenditures, were the major contributor to low net returns (profit). On the other hand, the wider use of foreign crew members enabled vessels to keep labor costs down; overall crew payments were relatively low, accounting for 11% of total average annual expenditures. We found a stark distinction in the operating profile of profitable vessels as compared to unprofitable vessels. Despite a higher vessel purchase price (on average), profitable vessels generated significantly greater annual revenues due to substantially higher CPUE, while also featuring lower non-labor variable inputs compared to unprofitable vessels. By estimating isoprofit curves for the fleet, we also determined that very small changes in albacore price (i.e., a few cents) and in the number of fish per hook can mean the difference between profitability and unprofitability for an average vessel.

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Appendix: American Samoa Longline Fleet Cost-Earnings Questionnaire

Date of interview: _____

Vessel Name: _____
Vessel's permit number: _____
Interviewee's name:_____ Contact (phone): _____
Interviewee position: ❑Vessel owner ❑Captain
Vessel operator: ❑Owner operated ❑ Hired Captain

I. About the owner OR owner operator (skip questions 1-2 if you are interviewing a hired captain, go to Q. 3)

How many fishing vessels do you own? _____ vessel(s)
How many vessels fish in **Am. Samoa Longline** Fishery_____
How many vessels fish in **other fisheries** _____

How many years have you owned a longline vessel in Am. Samoa? _____ years
How long have you owned this vessel? _____ years
What is the ownership? ❑ Sole ownership (or w/ family) ❑ Shared w/ others (corporation)
Have you ever owned a different longline vessel? ❑ Yes ❑ No If yes, how many? _____

1. Do you live in Am. Samoa? ❑ Yes ❑ No
If No Did you travel to or from Am. Samoa to handle fishing business? ❑ Yes ❑ No
If Yes a) What were the travel costs? $_____

2. Besides Am. Samoa, did you fish in another port in 2009? ❑ Yes ❑ No

If yes 1) How many trips? _____

II. About the hired captain *(Skip questions 3-6 if you are interviewing an owner or owner-operator, go to # 7)*

3. How did you find the captain for this vessel (if it was operated by a hired a captain) – *write down the details*
❑ your family member ❑ relative ❑ friend

4. How many years of commercial fishing experience does your captain have? _____ years

5. How many longline vessels have you worked on as a captain in the Am. Samoa longline fishery? _____ vessels

6. How long has your captain been in charge of this vessel? _____ years

III. About the Vessel

7. What was the vessel purchasing price? $_____

8. What is the vessel current (appraisal) value? $_____

9. What is the vessel replacement value? $_____

10. What were the start-up costs when the vessel was purchased? $_____

11. Fuel capacity: _____ gallons

12. When was the vessel built? _____ year

13. When was the vessel purchased?_____ year

14. What is the vessel length? _____ ft

15. What is the vessel width/beam? _____ ft

16. How fast does the vessel travel?
    Speed range: (max) _____knot/hr
    Average: _____ knot/hr

17. Fish holding capacity:_____ tuna trip (lbs) _____ swordfish trip (lbs)

18. Number and horsepower of engines

    Engine 1: _____ horsepower
    Engine 2: _____ horsepower

19. Do you use more than one reel? If yes, how many?_____

20. Did you use an icemaker in 2009? ❑Yes ❑ No

We need some information about the cost of a normal trip. Can I ask you some questions about this or would you prefer to show us your receipts or accounting records and we can add them up?

IV. Trip costs

Trip costs

21. How familiar are you with trip expenses?
❑ In charge of keeping track of trip expenses/ Very familiar with numbers
❑ Not very Familiar with expenses

22. FUEL

PRICE PER GALLON	GALLONS USED	TOTAL COST OF FUEL
$ ___.___	____	$ _____.___

23. ENGINE OIL

UNIT (Check One)	PRICE PER UNIT	QUANTITY PER UNIT USE	TOTAL COST
❑ 1 GALLONS	$ ___.___	____ GALLONS	$ ____.___
❑ 5 GALLONS (1 BAG/BUCKET)		____ BAG/BUCKET	
❑ 55 GALLONS (1 BARREL)		____ BARRELS	

24. BAIT

TYPE 1 (Check One)				PRICE PER BOX	BOXES USED	TOTAL COST
❑	SQUID	❑	MACKEREL	$ ___.___	____	$ _____.___
❑	SARDINE	❑	ANCHOVY			
❑	SANMA	❑				

TYPE 2 (Check One)

	SQUID		MACKEREL
	SARDINE		ANCHOVY
	SANMA		

PRICE PER BOX $. BOXES USED TOTAL COST $.

25. ICE (Check One)

UNIT (Check One)

	BLOCKS
	TONS
	LBS

PRICE PER UNIT $. UNITS USED TOTAL COST $.

26. FISHING GEAR COSTS (i.e. replaced items such as hooks, line, floats, raingear, etc)

$.

27. PROVISIONS COSTS (i.e. groceries, bottled water, etc.)

$.

28. TRIP COMMUNICATIONS COST (i.e. satellite phone calls, email, etc.)

$.

29. MISCELLANEOUS COSTS

$. Please list details of the miscellaneous costs:

Items	Costs ($)
(1).	$
(2).	$

30. TOTAL ESTIMATED TRIP COSTS **(Ask, Don't Add!)**

$.

Labor Costs

In the following questions the terms 'share' and 'percentage' (%) are generally interpreted as the same concept—part of the revnue from a fishing trip goes towards the crew. This is in contrast to 'flat rate' ($) which is when a crewmember earns the same amount of money regardless of the revenues from a fishing trip.

31. Were the crew (not including captain) paid by flat rate or by shares?
❑ Flat rate ❑ Shares ❑ Some flat rate, some shares

32. Which of the following trip expenses do you subtract from the trip revenue to get net revenue?
❑ Trip Costs ❑ Insurance
❑ Swordfish certificate ❑ Routine maintenance
❑ Communications

33. How many crew does the vessel usually have? _____ ❑including captain or ❑not

34. How many of them are other crew? _____ How many are of them paid by flat rate? _____Do flat rate crew receive bonus? ❑ Yes ❑ No

35. Did you have difficult time finding crew as you needed?
❑ Yes, always ❑ Yes, sometime ❑ No

36. What is the longest time a current crew has been working with this vessel? _____ yr

37. What is the shortest time a current crew has been working with this vessel? _____ yr

38. What are the flat rates and/or share percentages? (please list details)
Trip Revenue is defined as after sale revenue. Net revenue is defined as after sale and trip costs are deducted.

Position	Shares or %	Foreign (Y/N)	Of Trip Revenue or Of Net Revenue	Flat Rate Per Trip Or Per Month	Bonuses Per Trip Or Per Month	Initial payment	What year (for initial payment)
Owner(s)							
Owner/Operator							
Captain				$			
Crewmember1				$			
Crewmember2				$			
Crewmember3				$			
Crewmember4				$			
Crewmember5							
Crewmember6				$			

Any additional labor costs (such as VISA extension fee, return fees…)

Fish Sale Costs

39. Where do you sell your fish? Is there a fee? How much?
❑ Tuna Cannery. If Cannery, is the paycheck of crew or captain handled by the cannery? ❑ Yes ❑ No
❑ Other distributors or brokers (list the name(s)): _____ Handling fee _____

40. Did you have any shipping or transporting costs to the market (other than vessel fuel costs)? ❑ Yes ❑ No
If yes 1) Please describe the method of transport and costs:

_____ $_____

Fixed Costs

40. What were your mooring fees/**per month** in 2009? $ _____ or **/per year**

41. How much did you spend on bookkeeping / accounting costs in 2009?

$_____ ❑ per month or ❑ per year

42. What were your insurance costs per year in 2009? $ _____

This includes (please check):

- ❑ Vessel only
- ❑ Vessel and liability
- ❑ Pollution
- ❑ Liability only ("P" and "I")
- ❑ Health (Please specify who is covered) _____
- ❑ Vessel, liability, and health

43. When did you last dry dock your vessel? _____ yr
    43.1.1. How often do you dry dock? _____ yrs
    43.1.2. What was the total cost for your drydock (including costs paid to shipyard, repairs, painting, etc)? $_____

If the vessel dry docked in 2009, ask for cost information…

a) What major repairs were done in drydock? How many yrs between repairs?

_____ cost_____

_____ cost_____

_____ cost_____

_____ cost_____

44. Have you overhauled your engine in the past? ❑ Yes ❑ No

If yes 1) When did you last overhaul your engine? _____ yr

2) How much did it cost $ _____

3) How often do you overhaul your engine? _____ yrs

How much did you spend on routine repairs and maintenance (performed at least once a year) in 2009 (Beyond dry dock & trip costs)? $_____

45. Not including dry dock and trip variable repair costs, what major repairs (not done every year) were done in 2009? What were the costs?

_____ $_____

_____ $ _____

_____ $ _____

46. What gear/equipment did you replace or add in 2009? What were the costs and how often do you replace them?

_____ $ _____ yrs_____

_____ $ _____ yrs_____

_____ $ _____ yrs_____

_____ $ _____ yrs_____

47. Did you have any vessel loan payments in 2009? ❑ Yes ❑ No

If yes 1) How much were your payments per month? $ _____

2) How much time is left on this loan? _____ ❑ Years or _____ ❑ Months

48. Besides Am. Samoa, did you fish in another port in 2009 ? ❑ Yes ❑ No

If yes 1) How many trips? _____

49. Are there any other vessel costs which I haven't included? ❑ Yes ❑ No

If yes (Please list)_____ $_____

_____ $_____

_____ $_____

_____ $ _____