

## HIGHLY MIGRATORY SPECIES MANAGEMENT TEAM REPORT ON BLUEFIN TUNA MANAGEMENT MEASURES FOR 2015-2016 FISHERIES

In this report, the Highly Migratory Species Management Team (HMSMT) provides supplemental economic analyses and revised fishing effort information for the recreational fishery for bluefin tuna.

### Revised Effort Information

Revised CPFV effort estimates in number of tuna angler days by area and year are provided in Table 1 below. These estimates replace those previously reported (September 2014 Agenda Item G.4.b, HMSMT Report 2, Table 2 and June 2014 Agenda Item E.4.b, HMSMT Supplemental Report, Table 1). The revised estimates of CPFV angler days are considerably lower than the previous version due to elimination of double counting. Information previously provided on fishery catches and bag limit analyses are not affected.

**Table 1. For the CPFV fishery, revised estimates of the number of angler days targeting tuna plus days targeting another species where bluefin were caught, for waters in the U.S., Mexico, and Combined for 2000-2013.** (Source: Elizabeth Hellmers, CDFW, CPFV logbook data). Estimated angler effort (days) for the private vessel fishery in U.S. and in Mexico waters are from a custom analysis by CDFW (Michelle Horezcko, CDFW, personal communication).

Year	U.S. Waters off California			Mexico Waters			U.S. and Mexico Waters		
	Private Fishery	CPFV Fishery	Total	Private Fishery	CPFV Fishery	Total	Private Fishery	CPFV Fishery	Total
2000	-	18,512	-	-	69,890	-	-	88,402	-
2001	-	33,044	-	-	66,581	-	-	99,625	-
2002	-	39,958	-	-	67,655	-	-	107,613	-
2003	-	20,574	-	-	79,708	-	-	100,282	-
2004	-	10,033	-	-	79,950	-	-	89,983	-
2005	-	11,832	-	-	54,841	-	-	66,673	-
2006	-	9,082	-	-	53,522	-	-	62,604	-
2007	-	16,229	-	-	45,899	-	-	62,128	-
2008	34,265	9,078	43,343	16,075	52,495	68,570	50,340	61,573	111,913
2009	30,960	8,013	38,973	14,287	49,088	63,375	45,247	57,101	102,348
2010	16,290	4,664	20,954	7,863	32,112	39,975	24,153	36,776	60,929
2011	11,211	3,351	14,562	1,068	35,785	36,853	12,279	39,136	51,415
2012	27,627	8,670	36,297	0	57,910	57,910	27,627	66,580	94,207
2013	15,806	7,280	23,086	817	66,144	66,961	16,623	73,424	90,047

## **Economic Analyses**

### **I. Potential Economic Impacts of Recreational Management Measures for Bluefin Tuna**

West coast recreational fishing activity on bluefin tuna and other highly migratory species is primarily conducted from commercial passenger fishing vessels (CPFVs) and privately owned vessels fishing out of landings, marinas, and launch ramps dotting the Southern California coast from Los Angeles to San Diego ([Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species, as amended \(July 2011\), Appendix A](#)). The Sportfishing Association of California (SAC) is the major industry organization, representing nearly 200 CPFVs operating out of 23 landings from Morro Bay to San Diego. Direct expenditures in 2013 on marine recreational fishing trips in California District 1, which includes ports from Los Angeles south through San Diego, included roughly \$119 million on CPFV trips. In 2013, this fleet provided 380,000 and 152,000 angler days of fishing effort to U.S. and Mexican fishing grounds, respectively. The employment impacts of these trips supported about 1,537 full-time equivalent jobs in 2013 ([2013 California Marine Recreational Fishing Trip Effort and Preliminary Economic Impact Estimate](#)).

Bluefin tuna catch has sharply increased as a share of all CPFV HMS catch in recent years from levels below 10% from 2000-2007 to levels between 20% and 55% from 2011-2013 ([September 2014 Agenda Item G.4.b HMSMT Report 2, Figure 7](#)). Economic value due to recreational bluefin tuna catch is generated in the form of consumer surplus, producer surplus, and regional economic impacts<sup>1</sup>. Although bluefin tuna recreationally caught on west coast U.S. trips cannot legally be sold, allowing recreational anglers to catch and retain bluefin tuna for personal or community use can be an important factor in their decisions to take recreational fishing trips; conversely, depending on the level of regulation, limiting or eliminating the potential for recreational anglers to catch and retain bluefin tuna could reduce the demand (willingness to pay) for recreational fishing trips, resulting in a loss of consumer surplus. While anglers may be able to continue fishing for other species or practice catch and release bluefin tuna fishing if retained bluefin catch were limited by regulation, the reduction in choice of species to catch and retain could reduce the value of the fishing experience, leading to a loss of CPFV and private boat trip demand. A loss of producer surplus would result if reduced CPFV trip demand led to some combination of a reduction in the number of CPFV trips or the need for price reductions to attract anglers to continue taking trips. A decrease in the number of CPFV or private vessel recreational trips or prices is also predicted to result in a reduction in trip expenditures and attendant multiplier effects of recreational fishing, negatively impacting regional economic expenditures and jobs in supporting industries.

The U.S. west coast recreational and commercial fleets, related industries, consumers and other concerned parties could realize future benefits if current conservation measures led to improved future bluefin tuna fishing opportunities. Direct economic impacts of management on the west coast recreational fishery would be negative, immediate, and potentially significant depending on the particular alternative adopted, raising a question of fairness if the west coast recreational fleet and anglers experienced disproportional impacts due to management measures.

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<sup>1</sup> Consumer surplus measures the aggregate amount by which the benefit of consuming a product exceeds what consumers pay to obtain it. Producer surplus is the aggregate economic value of producer profits from providing a product. Regional economic impacts consider revenue flows due to an economic activity, such as CPFV vessels providing anglers with recreational fishing trip experiences; they include direct effects on the affected industry, indirect effects on related businesses such as suppliers of services and durable goods, and induced effects on household expenditures; regional employment impacts are also considered.

## II. Comparison of Estimated Angler and Bluefin Tuna Population Impacts of Bag Limit Reductions

A first step in assessing potential impacts of bluefin management measures on recreational demand is to estimate the impacts of different bag reductions on bluefin tuna angler experience. In addition, comparing angler impacts to anticipated reductions in bluefin tuna population impacts can provide insight on the tradeoffs for different potential bag reductions between regulatory impacts on anglers who recreationally target bluefin tuna and conservation benefits to the bluefin stock.

For this analysis, bluefin tuna fishing effort is defined to include all 2013 CPFV angler days where any tuna species was either targeted or caught, but limited to CDFW block/date combinations in which bluefin tuna were caught on CPFV trips. This definition of effort includes angler days when bluefin tuna were available in the area where fishing occurred but were not caught.

Table 2 shows the estimated impacts of potential bag reductions from current levels to numbers from 5 down to 0 bluefin tuna, where 0 represents a full moratorium on bluefin retention. The table is representative of 2013 CPFV trip logs for bluefin tuna effort in Mexico and U.S. waters. The left side of the table represents estimated impacts in U.S. waters; estimated impacts due to CPFV fishing in Mexico waters are represented on the right side. For each fishing area (U.S. or Mexico) and potential bag reduction, the leftmost two columns show estimated percentages of bags that would be reduced and average reductions in bag size for impacted anglers (those whose bags would be reduced). The rightmost two columns for each fishing area translate the estimated reduction in catch weight presented in [September 2014 Agenda Item G.4.b HMSMT Report 2, Figure 7](#) into an estimate of the decrease in the U.S. recreational fishery share of population impacts by all fisheries on the Pacific bluefin tuna stock.

**Table 2. Estimated CPFV Angler and Bluefin Tuna Population Impacts of Bag Limit Reductions**

Potential Bag Reductions	U.S. Waters				Mexico Waters			
	Percent of Bags Reduced	Average Bag Reduction for Impacted Anglers	Estimated Catch Savings (mts)	Estimated Reduction in Total Population Impacts	Percent of Bags Reduced	Average Bag Reduction for Impacted Anglers	Estimated Catch Savings (mts)	Estimated Reduction in Total Population Impacts
10 fish to 5 fish	1.7%	2.16	3	0.0%	0.3%	1.82	5	0.0%
10 fish to 4 fish	6.8%	1.54	9	0.0%	4.7%	1.11	52	0.3%
10 fish to 3 fish	10.8%	1.98	18	0.1%	8.0%	1.65	131	0.6%
10 fish to 2 fish	17.0%	2.26	32	0.2%	13.0%	2.02	260	1.3%
10 fish to 1 fish	26.9%	2.43	55	0.3%	21.8%	2.20	477	2.3%
10 fish to 0 fish	54.9%	2.19	93	0.4%	40.4%	2.19	891	4.3%

Figure 1 shows a comparison of the estimated percentage of bags that would be reduced (horizontal scale) to the estimated reduction in total population impacts under different proposed bag limit reductions for fishing in U.S. waters (vertical scale), comparing data in the second and fifth columns of Table 2. Proposed reduced bag limits are displayed as labels on data points. A change from a bag limit of 2 to a full moratorium would increase the percent of U.S. water angler bags reduced from 17.0% to 54.9%; the associated reduction in total bluefin tuna population impacts would increase from 0.2% to 0.4%.

**Figure 1. Angler and Total Population Impacts for Reduced Bag Limits in U.S. Waters**

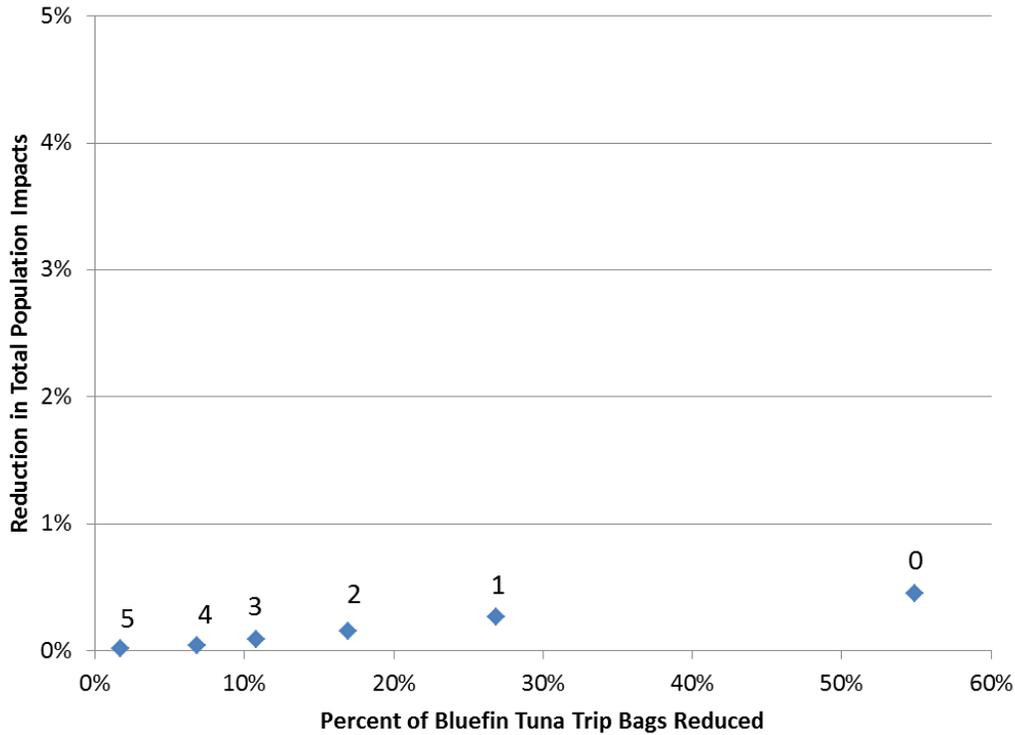
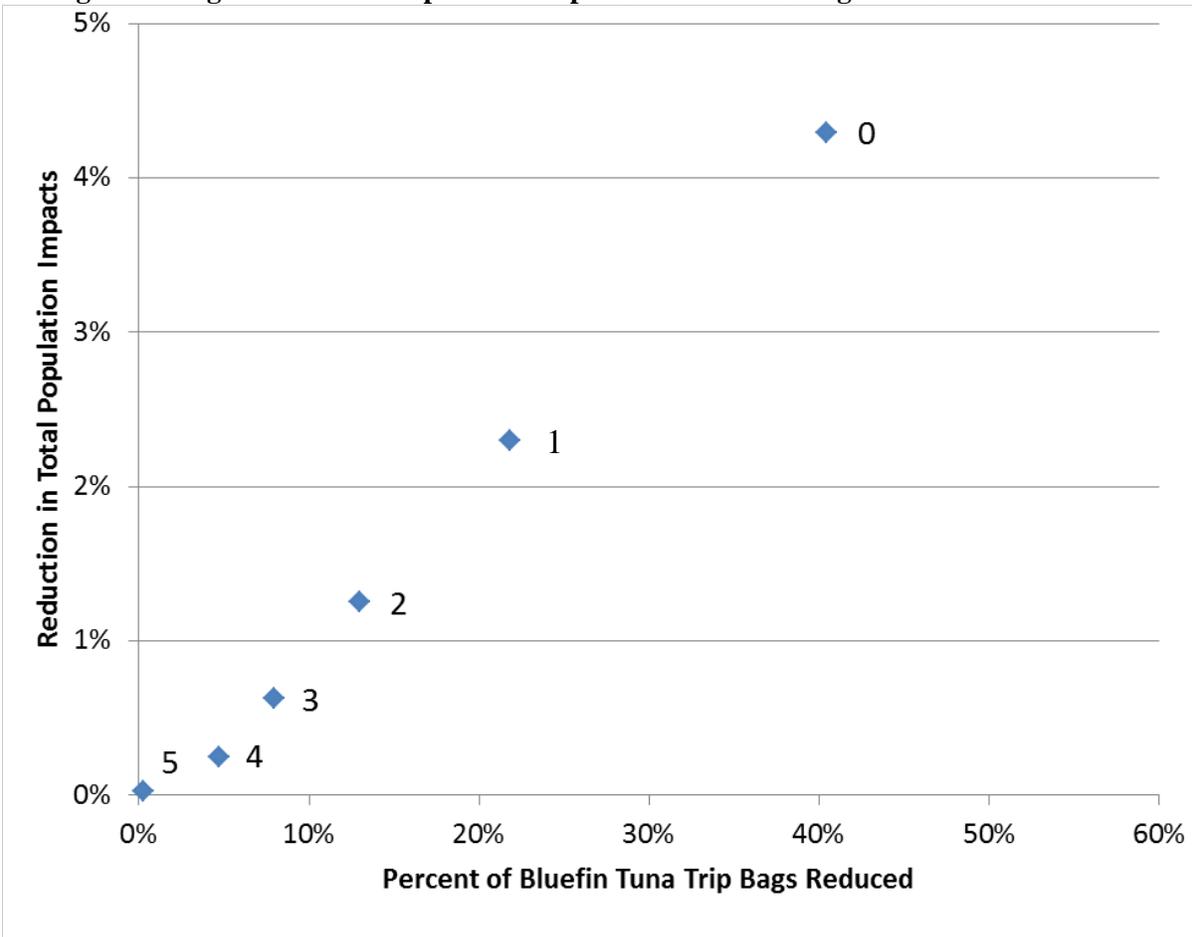


Figure 2 displays the comparable information for bag limits applied to fishing in Mexico waters, based on data in columns six and nine of Table 2. With a bag limit of 1, an estimated 21.8% of U.S. bluefin tuna bags for fishing in Mexico waters would be reduced in exchange for a 2.3% reduction in total bluefin tuna population impacts.

These results are representative of the operation of the fishery in 2013, before the prohibition of the recreational bluefin fishery for the remainder of the year in Mexico waters after the commercial quota was reached. In case Mexico continues to take this approach of disallowing recreational bluefin catch when the commercial quota is reached, Mexico water impacts may occur regardless of the proposed action on bag limits. However, a closure of the Mexico recreational bluefin tuna fishery to U.S. anglers could also result in a shift in CPFV effort on bluefin tuna to areas inside the U.S. EEZ west of San Diego, where the vast majority of CPFV bluefin tuna effort in U.S. waters occurs. This could result in considerably larger economic impacts of bag reductions in U.S. waters than indicated by this analysis.

**Figure 2. Angler and Total Population Impacts for Reduced Bag Limits in Mexico Waters**



**III. Potential Employment Impacts of Bluefin Tuna Bag Limits**

Employment impacts for CPFV fishing out of ports in District 1 roughly divide into 1,099 jobs due to fishing in U.S. waters and 438 jobs due to fishing in Mexico waters; the fishing effort which generates these jobs includes half-day trips and trips targeting other species besides tunas, such as bass and rockfish. An analysis of bluefin tuna angler days out of District 1 ports showed that 1.8% of all 2013 District 1 CPFV angler days in U.S. waters represented bluefin tuna effort, while 53.4% of District 1 CPFV angler days in Mexico waters were due to bluefin tuna effort. District 1 CPFV jobs due to U.S. and Mexico water effort were rescaled by the shares of bluefin tuna angler days to obtain baseline employment impacts of bluefin tuna fishing, as shown in Table 3.

**Table 3. Baseline Employment Impacts of 2013 CPFV Fishing Effort**

Fishing Location	U.S. Waters	Mexico Waters
1) All District 1 CPFV Angler Days	380,380	151,620
2) All District 1 CPFV Jobs Impact	1,099	438
3) Bluefin Tuna Trip Share of District 1 Angler Days	1.8%	53.4%
4) Bluefin Tuna Trip Jobs Impact: (2) X (3)	20	234

A possible consequence of reduced bag and retention limits for bluefin tuna is a loss of employment in the CPFV fishing industry, due to a drop in demand for trips if a significant number of CPFV anglers are impacted. Because in most years, anglers can catch other highly migratory species if bluefin tuna are unavailable, it is possible that a smaller number of anglers will forego trips than the percent of anglers who would experience bluefin tuna bag size reductions. However there are also reasons the drop in trip demand could exceed the percent of anglers reaching bag or retention limits. For instance, angler demand for trips may depend more heavily on the potential amount of bluefin tuna they can catch and retain than the likely actual amount. A bag limit reduction from 10 down to 2 may be interpreted as a likely reduction of 8 fish per day for a trip, possibly resulting in a much larger decline in trip demand than suggested by relatively smaller estimated average bag size reductions.

Since the actual demand response to bag limits is unknown, a scenario analysis was employed to estimate potential industry job loss, using demand loss multiples of 0.25, 0.5, 1 and 1.5 times the anticipated percent of bags reduced to estimate the decline in numbers of CPFV trips. Based on the limited share of bluefin tuna angler days as a proportion of all 2013 CPFV effort in U.S. waters out of District 1 ports, loss of 10 or more full-time equivalent jobs is not predicted to occur for reduced bag limits in U.S. waters unless a full moratorium on bluefin tuna retention is passed. However, due to the much greater bluefin tuna angler day share of CPFV effort in Mexico waters, job loss exceeding 10 is predicted to occur beginning at a bag limit reduction of 4, with a potential full-time equivalent job loss exceeding 100 in the case of a moratorium on retained bluefin tuna catch and retention for bluefin tuna caught in Mexico waters. The results for the full range of scenarios are shown in Table 4.

**Table 4. Estimated Job Loss under a Range of Bluefin Tuna Bag Limit Reduction Scenarios**

Potential Bag Reductions	U.S. Waters					Mexico Waters				
	Percent of Bags Reduced	Demand Loss Multiplier for Scenario				Percent of Bags Reduced	Demand Loss Multiplier for Scenario			
		0.25	0.5	1	1.5		0.25	0.5	1	1.5
10 fish to 5 fish	1.7%	0.1	0.2	0.3	0.5	0.3%	0.2	0.3	0.7	1.0
10 fish to 4 fish	6.8%	0.3	0.7	1.4	2.1	4.7%	2.7	5.5	11.0	16.5
10 fish to 3 fish	10.8%	0.5	1.1	2.2	3.2	8.0%	4.7	9.3	18.7	28.0
10 fish to 2 fish	17.0%	0.8	1.7	3.4	5.1	13.0%	7.6	15.2	30.4	45.5
10 fish to 1 fish	26.9%	1.3	2.7	5.4	8.1	21.8%	12.7	25.5	51.0	76.5
10 fish to 0 fish	54.9%	2.7	5.5	11.0	16.5	40.4%	23.7	47.3	94.6	142.0

#### IV. Anticipated Benefits and Costs of Potential Management Alternatives

The following discusses anticipated benefits and costs of potential management alternatives, using quantitative information where available to strengthen the comparison.

##### Management Alternatives for Bag and Possession Limits

###### **Alternative 1 (No Action): Continue daily bag limit of 10 bluefin and possession limit of 30 bluefin**

This alternative would avoid imposing any regulatory costs on the west coast recreational fleet due to more stringent bluefin tuna management measures. However it would fail to address conservation concerns regarding recent levels of bluefin tuna mortality due to west coast recreational fishing.

###### **Alternative 2: Reduce bag limit to two fish per day and the possession limit to six fish for multi-day trips (Preliminary Preferred Alternative)**

With a bag limit reduction to 2 fish, an estimated 17.0% of bags in U.S. waters and 13.0% of bags in Mexico waters would be limited below current allowable levels. The average retained catch per angler who reaches the new limit would decrease by 2.26 fish in U.S. waters and 2.02 fish in Mexico waters compared to fishing under current management. Under the PPA, between 1 and 46 jobs could be lost compared to the No Action Alternative, depending on the demand loss multiplier and the degree to which restrictions in U.S. waters affects fishing in Mexico waters.

**Alternative 3: Harmonize U.S. daily bag and possession limits for federal waters off California with Mexico's current regulations for bluefin tuna.**

This alternative would affect anglers who catch more than five bluefin tuna on one day of a trip or more than 15 bluefin tuna over three days. Direct conservation benefits to the stock would be realized due to bluefin tuna mortality reductions stemming from the bag limit reduction. Only effort inside the U.S. EEZ would be affected. Anticipated impacts on angler experience and employment would be quite limited under this alternative, as seen in the top rows of Table 2 and Table 4.

**Alternative 4: Reduce daily bag and possession limits to below 5 fish per day and 15 fish in possession for federal waters off California, and as a potential suboption, limit possession of fish caught in Mexico to no more than the corresponding U.S. possession limits.**

The bottom five rows of Table 2 show impacts of bag reductions to below 5 fish per day on angler experience and U.S. recreational mortality; the bottom 5 rows of Table 4 show employment impacts for bag reductions below 5. The percentage of angler bags that would face a reduction increases steeply while the reduction in U.S. recreational mortality increases by small amounts, particularly for fishing in U.S. waters. Estimated employment impacts also increase sharply with lower bag limits; for instance, job loss in the CPFV industry on the range from 14 to 85 is expected with a bag reduction to 1 fish per day.

**Alternative 5: Prohibit retention of bluefin tuna by recreational fisheries.**

This alternative could potentially impose severe economic impacts on the west coast U.S. recreational fishery. The degree of severity would depend the degree of angler substitution between species which would impact the angler consumer surplus loss due to excluding bluefin tuna from the species they were allowed to catch, the loss of producer surplus to the recreational fleet if angler demand for trips significantly declined, and the potential for the fleet to cease normal operations in the face of a bluefin tuna moratorium. Upwards of 40 percent of anglers would face bag size reductions, with anticipated employment loss on the range from 26 to upwards of 150 jobs.

Management Alternatives for At-sea Filleting

Adopting bag limits for PBF that differ from other tunas caught in recreational fisheries (principally yellowfin and albacore tuna) requires that the different species can be distinguished for monitoring and enforcement purposes. This raises a concern regarding at-sea filleting, in case this practice makes it difficult to determine how many of each species of fish were caught on a trip. However, filleting at sea provides income in the form of tips for CPFV crew and facilitates the storage and transport of fish. On-shore processing services are available at prices from \$0.60 a pound for basic gill, gut, and head removal (e.g., \$24 for processing two 20-pound fish) up to \$2.25 a pound for fish jerky; since on-board processing services provided by crew members are likely less expensive and avoid the need to transport the fish to the on-shore processor, there are

savings to the angler if at-sea processing is allowed. The alternatives under consideration are listed below, with discussion of policy implications and potential economic impacts. They would only apply to processing of tuna at sea by recreational harvesters fishing south of Point Conception.

**No Action Alternative: Current state requirements, which allow filleting as long as a 1-inch square patch of skin is left on the fillet.**

The current requirement, which allows filleting at sea, does not allow species identification necessary to enforce bag limit reductions because several key diagnostic characteristics (e.g., pectoral fin) are removed during the filleting process.

**Alternative 2: Preliminary Preferred Alternative: Filleting of tuna at sea would be authorized in a manner that allows for both the species and the quantity of tuna taken aboard a vessel to be determined.**

If a technique can be developed to enable filleting at sea while allowing species identification and quantity of tuna taken aboard a vessel to be determined, this could allow the current practice of filleting at sea to continue under reduced bag limits. Crew members who currently earn significant tip revenue from at-sea filleting could continue to do so.

**Alternative 3: Filleting of tuna at sea would be prohibited, while continuing to allow processing to remove organs and viscera (i.e., allowing only gilling and/or gutting).**

In case it proves infeasible to identify species or retained catch counts while continuing to allow filleting at sea, this approach could provide an intermediate option between filleting and an outright ban on processing at sea. This alternative would reduce tip revenues for fish that would otherwise have been filleted and potentially imposes additional costs on anglers who would have to make arrangements for onshore processing in lieu of at-sea filleting.

**Alternative 4: Filleting of tuna at-sea would be prohibited, while continuing to allow processing to remove the head and organs and viscera (i.e., allowing only heading or gilling/gutting).**

This measure would similarly reduce or eliminate tip revenues from filleting at-sea, while imposing additional costs and inconvenience on anglers who would need to make arrangements and incur added costs for processing their catch on shore.

**Alternative 5: Prohibit any processing of tuna at sea.**

This alternative would eliminate potential tip revenue to crew members who currently offer at-sea filleting services. Additional effort and expense would be incurred by anglers required to land their catch whole. Industry representatives have also expressed a potential public health concern if requiring anglers to land their catch whole leads to an increase in the inappropriate disposal of fish waste products on shore.