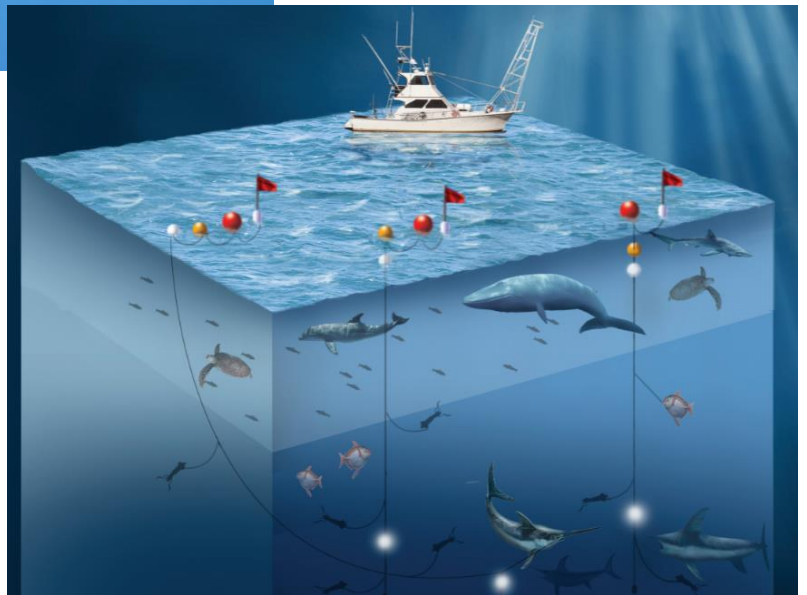


# DSBG Findings

June 2016

Helping Fishermen and Policy  
Makers Explore the Economics of  
Deep Set Buoy Gear in the West  
Coast Swordfish Fishery



Photos courtesy of The Pew Charitable Trusts

Developed by Cap Log Group, LLC

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## Purpose of the Project and the DSBG Calculator

As researchers and fishermen worked together over the past few years (under an Exempted Fishery Permit) to test and improve the catch efficiency of Deep Set Buoy Gear (DSBG) in the West Coast Swordfish Fishery, The Pew Charitable Trusts (hereinafter, “Pew”) commissioned Cap Log Group, LLC (hereinafter, “CapLog”) to develop a tool that would be helpful to fishermen, policy makers and other parties interested in the financial viability of DSBG as an authorized gear in the Fishery.

Based on publicly available documents as well as interviews with a range of individuals directly involved in the West Coast Swordfish Fishery, CapLog developed the **Financial Calculator for Estimating the Profitability of Deep Set Buoy Gear in the West Coast Swordfish Fishery (hereinafter, “the DSBG Calculator”)** to provide insights into the potential profitability and subsequent scalability of DSBG in this Fishery. The easy-to-use tool provides users with reasonable baseline information and assumptions (developed through interviews and recent data) which they can then adjust to reflect their particular business situations, expectations and experience.

Ideally, the DSBG Calculator will help advance fruitful conversation and collaborative decision-making as policy makers and other stakeholders in the West Coast Swordfish Fishery consider authorization of Deep Set Buoy Gear for the Fishery. This Overview provides some insights into key metrics and variables that will be important to track to determine the likely future profitability and scalability of DSBG trips in the West Coast Swordfish Fishery.

*Note: CapLog acknowledges that fishing businesses involved in the West Coast Swordfish Fishery face changing conditions year-to-year and season-to-season in both the catch per unit effort and the market. CapLog did NOT attempt to develop assumptions that apply to every fishing business or to postulate likely outcomes for all fishing businesses. The main purpose of the DSBG Calculator is to provide a tool to fishing businesses to help them consider potential financial implications of using Deep Set Buoy Gear and to policy makers as they consider authorization of this particular gear.*

## Basic Approach and Rationale

At the simplest level, the financial viability and scalability of DSBG as an authorized gear in the West Coast Swordfish Fishery is defined by the expected profitability of the gear, both in absolute terms and in relation to other business (fishing) opportunities available to the fishermen authorized to use the permit in the Fishery.

### In absolute terms:

*Is the business of fishing for swordfish with DSBG profitable – with both the cost of DSBG swordfish trips and the pro-rated fixed costs of the fishing business (vessel costs, other fixed costs) included?*

If not, are there changes in key variables (such as the price per pound or the catch per unit effort) that would create a profitable business?

### In relative terms:

*Is the business of fishing for swordfish with DSBG - with both the cost of DSBG swordfish trips and the pro-rated cost of the fishing business (vessel costs, other fixed costs) included – more profitable than fishing for swordfish with other gear types (e.g., drift gillnet) or than fishing for other species (e.g., albacore, groundfish) in locations or during seasons when swordfish are caught?*

If not, are there changes in key variables (such as the price per pound, the catch per unit effort, cost of monitoring, probability of fishery closures) that would affect the profitability of the DSBG fishing business relative to other business (fishing) opportunities?

Finally, the on-shore infrastructure needed to process and distribute swordfish caught with DSBG must also be financially viable to make DSBG one that could scale over time. Substantial swings in the timing or the composition of the catch may require changes in processing and distribution infrastructure. As such, it is also important to consider:

*Will the landings in the swordfish fisheries be reasonably comparable in quantity and frequency as in prior years?*

All of these questions will become much easier to answer as more fishing vessels use DSBG and the data from vessels using DSBG in the West Coast Swordfish increases. The DSBG Calculator is a simple and easily updatable tool for inputting refined information to determine more defensible answers to these questions.

## General Findings

The screen shot below is from the tab “DSBG Calculator.” The user can make adjustments in the purple cells to see the impact on landings, catch per unit effort, total landings, total revenue and total operating profit.

Key User Inputs	User Input
Average Price per Pound of Swordfish (Dressed) on DSBG-Only Trips	\$ 6.50 / lb
Average Number of Swordfish Caught per DSBG-Only Trips	4.0 animals / trip
Average Dressed Weight of Each Swordfish Landed on DSBG-Only Trips	175 lbs / animal
Number of Vessels Permitted and Active in DSBG-Only Trips	20 vessels
Average Annual Number of DSBG-Only Trips per Vessel	15 trips / vessel
Average Number of Days per DSBG-Only Trip	3.5 days / trip
Average Annual Number of Days Vessel Used for Non-DSBG Fishing	100 days / year

The table below summarizes the impact on the Fishery’s annual DSBG swordfish trip landings, the total revenue from DSBG swordfish trips and the total net operating profit from DSBG swordfish trips by varying the number of vessels fishing (either 20 or 50 vessels), the number of swordfish caught per trip (4 swordfish per trip or 8 swordfish per trip) and the price per pound (\$6.50/lb., \$8.00/lb., \$10.00/lb.). As explained in more detail in the pages following, each of these scenarios is based on different fishing experiences. For example, the catch rate of 4 swordfish per trip is less than the average rate for the 2015 fishing year experienced by the PIER vessels (4.5 swordfish per trip) and the 8 swordfish per trip is less than the 14 swordfish per trip experienced in the best month of the EFP.

# of Vessels	Swordfish per Trip	Price per Pound	Total Swordfish Landings (MT)	Total Revenue from Swordfish Trips	Total Net Operating Profit from Swordfish Trips
20 vessels	4 swordfish per trip	\$6.50 / pound	103 MT	\$ 1,545,000	\$ 70,316
20 vessels	4 swordfish per trip	\$8.00 / pound	103 MT	\$ 1,680,000	\$ 227,816
20 vessels	4 swordfish per trip	\$10.00 / pound	103 MT	\$ 2,100,000	\$ 437,816
20 vessels	8 swordfish per trip	\$6.50 / pound	206 MT	\$ 2,910,000	\$ 752,816
20 vessels	8 swordfish per trip	\$8.00 / pound	206 MT	\$ 3,540,000	\$ 1,067,816
20 vessels	8 swordfish per trip	\$10.00 / pound	206 MT	\$ 4,380,000	\$ 1,487,816
50 vessels	4 swordfish per trip	\$6.50 / pound	257 MT	\$ 3,412,500	\$ 175,790
50 vessels	4 swordfish per trip	\$8.00 / pound	257 MT	\$ 4,200,000	\$ 569,540
50 vessels	4 swordfish per trip	\$10.00 / pound	257 MT	\$ 5,250,000	\$ 1,094,540
50 vessels	8 swordfish per trip	\$6.50 / pound	515 MT	\$ 7,275,000	\$ 1,882,040
50 vessels	8 swordfish per trip	\$8.00 / pound	515 MT	\$ 8,850,000	\$ 2,669,540
50 vessels	8 swordfish per trip	\$10.00 / pound	515 MT	\$ 10,950,000	\$ 3,719,540

### Potential Volume of DSBG Fishery

HMS reports 66 MT of swordfish were landed by the drift gillnet (DGN) fleet in the 2015 calendar year (swordfish fishing years begin in February). Twenty vessels taking 15 DSBG trips and having an average catch rate of 4 swordfish per trip (lower than that of the DSBG vessels participating in the EFP in 2015) would land more swordfish during a twelve-month period than what the 18 DGN vessels reported for swordfish landings in the 2015 calendar year. Higher average catch rates and/or more vessels taking DSBG trips would further increase total landings.

### Potential Absolute Profitability of DSBG Fishery

The base scenario described above would result in approximately \$70,316 in net operating profit from swordfish trips cumulatively for the 20 vessel owners (or \$3,516 per vessel). This income would represent a 19% profit margin.

An increase in the efficiency of catch from 4 swordfish per trip to 8 swordfish per trip would increase the net operating profit for 20 vessel owners to \$752,816 at \$6.50/lb. (34% profit margin) and to \$1.5 million at \$10.00/lb (40% profit margin).

### Potential Relative Profitability of DSBG Fishery

While the absolute profitability in the base scenario (of 4 swordfish per trip and \$6.50/lb.) would be positive for DSBG fishing, the profitability under this scenario would be less than that of drift gillnet fishing. However, if other variables were kept constant and the swordfish catch per trip increased to 8 swordfish per trip DSBG would be more profitable than DGN.

	DGN Only (includes Rapid Adjustment)		DSBG Only (includes Rapid Adjustment)	
	Year One	Year Two	Year One	Year Two
Average Days per Trip	7.0 days / trip		3.5 days / trip	
Average Number of Swordfish (Animals) per Trip	21.0 animals / trip		8.0 animals / trip	
Average Dressed Weight of Swordfish Landed (per Animal)	150 lbs / animal		175 lbs / animal	
Average Swordfish Landings (Lbs) per Trip	3,071 lbs / trip		1,400 lbs / trip	
Average Price per Pound of Swordfish (Dressed)	\$ 3.50 / lb		\$ 6.50 / lb	
Total Number Trips	12 trips	7 trips	15 trips	15 trips
Revenue from Swordfish	\$ 132,300	\$ 71,925	\$ 136,500	\$ 136,500
Gross (Trip) Profit (including other marketable fish)	\$ 38,826	\$ 19,783	\$ 46,999	\$ 46,999
Gross (Trip) Profit Relative to DGN Only	NA	NA	\$ 8,173	\$ 27,216
Net Operating Profit (including other marketable fish)	\$ 28,538	\$ 12,372	\$ 37,641	\$ 37,641
Net Operating Profit Relative to DGN Only	NA	NA	\$ 9,103	\$ 25,269
2-Year Gross (Trip) Profit (including other marketable fish)	\$ 58,609		\$ 93,998	
2-Year (Trip) Gross Profit Relative to DGN Only	NA		\$ 35,389	
2-Year Net Operating Profit (including other marketable fish)	\$ 40,910		\$ 75,282	
2-Year Net Net Operating Profit Relative to DGN Only	NA		\$ 34,371	

## Key Variables

Find below a summary of key variables and the rationale behind the initial assumptions (baseline information) in the DSBG Calculator. Note that these assumptions can be refined with more granular data sets from NMFS and with additional review from researchers and fishermen testing the DSBG on swordfish.

### Price per Pound

As with any seafood product with significant day-to-day variances in supply and quality, the price per pound of swordfish varies. Interviews suggest swordfish caught using harpoon and DSBG tend to fetch higher prices than drift gillnets because the fish are typically of better average quality.

DGN-Only	Harpoon-Only	DSBG-Only
\$2.95 / lb = Estimate based on average reported revenue and landings in HMS Table 12 and 13 in 2013, 2014 and 2015	\$6.09 / lb = Estimate based on average reported revenue and landings in HMS Table 16 and 17 in 2013, 2015 and 2015	
\$4.25 - \$4.50 / lb = Estimate based on interviews with industry	\$8.00 / lb = Estimate based on interviews with industry	\$7.00 / lb = Estimate based on initial interviews with industry
<i>Baseline: \$3.50 / lb</i>	<i>Baseline: \$8.00 / lb</i>	<i>Baseline: \$6.50 / lb</i>

### Number of Trips

The number of swordfish trips combined with the Catch per Unit Effort (below) generates estimated annual pounds of swordfish landings.

DGN-Only	Harpoon-Only	DSBG-Only
4 trips / year = Estimate based on average reported trips in HMS Table 14 in 2013, 2014 and 2015	2 trips / year = Estimate based on average reported trips in HMS Table 18 in 2013, 2014 and 2015	15 trips / year = Estimate based on interviews with industry.
15 trips / year = Estimate based on interviews with industry.	10 trips / year = Estimate based on interviews with industry.	
<i>Baseline: 10 trips / year allocated by month based on interviews</i>	<i>Baseline: 8 trips / year allocated by month based on interviews</i>	<i>Baseline: 15 trips / year allocated by month based on interviews</i>

### Hard Cap Closures

The implementation of “hard cap fishery closures” will impact the number of swordfish trips taken in future years.

DGN-Only	Harpoon-Only	DSBG-Only
Interviews suggest the hard cap closures will be for DGN	Interviews suggest the hard cap closures will be for DGN. Increased trips for harpoon-only may occur after the closure	Interviews suggest the hard cap closures will be for DGN. Increased trips for DSBG-only may occur after the closure
<i>Baseline: Hard Cap Closures for DGN Trips Only. Month of DGN Closure based on Historic Bycatch Rates.</i>	<i>Baseline: Hard Cap Closures for DGN Trips Only. Month of DGN Closure based on Historic Bycatch Rates.</i>	<i>Baseline: Hard Cap Closures for DGN Trips Only. Month of DGN Closure based on Historic Bycatch Rates.</i>

**Catch per Unit Effort**

Catch per Unit Effort (CPUE) is a measurement of the efficiency of the fishing business, normalizing the volume of catch (in pounds) against the time fishing (in either hours, days or trips).

**Average Number of Swordfish per Trip**

The number of swordfish caught per trip not only varies by gear type but, just as importantly, by vessel, season and year.

DGN	Harpoon	DSBG
20-25 swordfish / trip = Estimate based on average reported HMS landings, recent observer data and interviews. Interviews suggested a number on the lower end for the most recent season  <i>Baseline: 21 swordfish / trip</i>	0-1 swordfish / trip = Estimate based on average reported HMS landings, recent observer data and interviews.  <i>Baseline: 0.5 swordfish / trip</i>	3-15 swordfish / trip = Estimate based on interviews.  <i>Baseline: 4 swordfish / trip</i>

**Average Weight of Swordfish per Trip**

The average weight of swordfish caught per trip not only varies by gear type but, just as importantly, by vessel, season and year.

DGN	Harpoon	DSBG
125-200 lbs / swordfish = Estimate based on average reported HMS landings, recent observer data and interviews.  <i>Baseline: 150 lbs / swordfish</i>	150-250 lbs / swordfish = Estimate based on average reported HMS landings, recent observer data and interviews.  <i>Baseline: 175 lbs / swordfish</i>	150-250 lbs / swordfish = Estimate based on interviews.  <i>Baseline: 175 lbs / swordfish</i>

**Average Days per Trip**

The average days per trip generally varies less than the average price, number or weight of swordfish.

DGN	Harpoon	DSBG
5-8 days / trip = Estimate based on interviews  <i>Baseline: 7 days / trip</i>	1-2 days / trip = Estimate based on interviews  <i>Baseline: 1 day / trip</i>	2-5 days / trip = Estimate based on interviews  <i>Baseline: 3.5 days / trip</i>



### Vessel Costs

Several cost buckets (price of diesel, crew share, allocation of trip costs between crew and vessel owner) will affect the profitability of the swordfish fishing business. The initial assumptions are based on past experience in fisheries on the West Coast and interviews. *One of the most important variables to assess is the number of non-swordfish trips a vessel will take during the year. This input changes the allocation of fixed costs applied to the swordfish fishing business – based on the number of days fishing.*

### Trip Costs

Other cost buckets relate to particular characteristics or costs associated with particular trip types (gear types). The initial assumptions are based on data review and interviews.

### Fishery-Level Costs

Other cost buckets relate to particular characteristics or costs associated with the fishery itself.

### At-Sea Monitoring

The percentage of trips with at-sea monitoring and the costs of this monitoring to the vessels will affect overall trip profitability.

DGN	Harpoon	DSBG
Council: 30% monitoring with costs covered 100% by NMFS	Interviews: 0% monitoring	Interviews: 30% monitoring with costs covered 100% by NMFS
<i>Baseline: 30% monitoring with costs covered 100% by NMFS</i>	<i>Baseline: 0% monitoring</i>	<i>Baseline: 30% monitoring with costs covered 100% by NMFS</i>

### Electronic Monitoring

The percentage of trips with electronic monitoring and the costs of this monitoring to the vessels will affect overall trip profitability. Given the early stage of conversations about electronic monitoring in the swordfish fishery, we have set the percentage of electronic monitoring coverage at 0% for all gear types.

## **Notes and Comments**

While the model and the assumption in the model were developed and refined by our team, we would like to thank the fishermen and other stakeholders that responded to our questions and provided feedback. In particular, we would like to thank Dr. Stephen Stohs of the Southwest Fisheries Science Center and Dr. Chugey Sepulveda of the Pflieger Institute of Environmental Research for their participation.

Please note that many of the initial assumptions related to the drift gillnet fishery were grounded in public information provided through HMS reports on the swordfish fishery. Dr. Stohs has been working with his team since October to provide more granular data that should help inform more detailed assumptions behind the model. We look forward to sharing that information when we receive it. Users should be able to incorporate it directly into the model.

Similarly, Dr. Sepulveda is currently capturing an increased stream of experience and data from fishermen fishing for swordfish with DSBG under the current EFP. His team will be another key resource in improving the assumptions behind this model related to use of DSBG in the West Coast Swordfish Fishery.

## **Questions and Feedback**

As noted in the introduction, CapLog hopes that the DSBG Calculator will help advance fruitful conversation and collaborative decision-making as policy makers and other stakeholders in the West Coast Swordfish Fishery consider authorization of Deep Set Buoy Gear for the Fishery. We are happy to respond to questions and suggestions. Please feel free to [email](#) us.