

Comparing U.S. swordfish fisheries: Metrics for bycatch, economics, and commercial volume

*HMSMT Agenda Item E.2 Supplemental Report
June 22, 2014*

Background

- This HMSMT heard a report by economist Heidi Gjertsen at their May 2014 HMSMT meeting on an analysis to compare U.S. swordfish fisheries in terms of metrics for catch, bycatch and economic performance
- This presentation provides an updated version which includes metrics for commercial volume

Overview

- Fisheries Included
- Methods
 - Bycatch Metrics
 - Economic Metrics
 - Commercial Volume Metrics
- Data Sources and Limitations
- Preliminary Results

Fisheries Included

- California drift gillnet (CA DGN^S)
- Pre-2005 California shallow-set longline (CA SSL^S)
- California harpoon (CA HPN^S)
- Hawaii shallow-set longline (HI SSL^S)
- Hawaii deep-set longline targeting tuna (HI DSLL^T)
- Atlantic pelagic longline (ATL LL^{S-T})
- Atlantic buoy (ATL BG^S)
- Post-2004 Hawaii shallow-set longline with landings to California (recent swordfish landings)

EXPERIMENTAL:

- California deep-set longline (CA DSLL^S)
- California buoy gear (CA BG^S)

* S = swordfish, T= tuna

Methods: Bycatch Metrics

- Ratio of landings per protected species take (L/B)
- “High priority” protected species
 - ESA-listed or strategic stocks (MMPA)
- Other protected species
- Finfish example: blue sharks

Methods: Economic and Commercial Volume Metrics

Economic Metrics

- Ratios of revenues, variable costs and profits (\$2012) to metric tons of landings

Commercial Volume Metrics

- Fleet-level average annual swordfish and total landings
- Vessel-level average annual swordfish and total landings

Data Sources and Limitations

Data sources

- Landings receipt databases (e.g. PacFIN)
- Observer data for catch and bycatch counts
- Cost-earnings studies for costs and profits
- Logbook data are used where needed as a supplement

Limitations

- Finfish bycatch observer data are not currently available for all fleets
- Levels of observer coverage vary across fisheries from no coverage to full coverage
- Profit and cost metrics may not be representative due to short data windows

Preliminary Results: Bycatch Metrics (1)

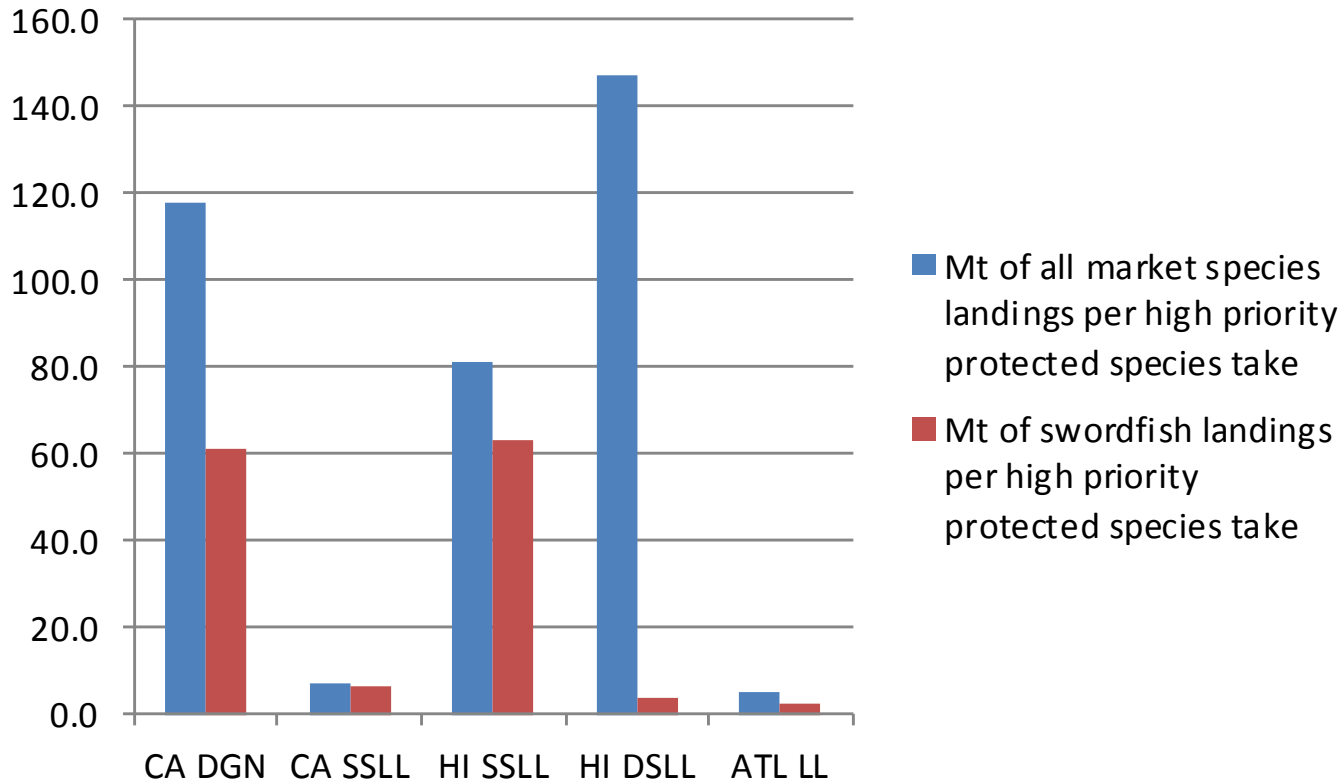
1. CA swordfish fisheries compare favorably to the Atlantic swordfish fishery in terms of landings relative to high priority protected species bycatch (Figure 1).
2. HI SSL^S 2005-2012 showed significantly higher SWO production per high priority protected species take compared to the pre-2005 CA SSL^S fishery.
3. The CA DGN^S and HI SSL^S fisheries produced the highest landings of swordfish per high priority protected species take among all gears under comparison.
4. The HI DSLL^S fishery had the highest amount of all market species landings per high priority protected species take.

Preliminary Results: Bycatch Metrics (2)

5. HI DSLL^T has the highest total landings relative to bycatch.
6. Only one CA DSLL^T vessel uses similar methods, with 100% observer coverage. The only record of a protected species interaction was one olive ridley turtle in 2006.
7. Comparisons of swordfish landings to bycatch may be misleadingly low for fisheries which land a significant amount of other market species besides swordfish (e.g. CA DGN^S, HI DSLL^T, ATL LL^{S-T}). Total landings are a more relevant measure for these fisheries.
8. Blue sharks are a species with some commercial landings which are not endangered, protected, subject to overfishing or overfished. A more relevant bycatch metric would be to compare landings to bycatch weights rather than to catch counts.

Preliminary Results: Bycatch Metrics (3)

Figure 1. Mt of all market species and swordfish landings per high priority protected species take



Preliminary Results: Economic and Commercial Volume Metrics

Economic Metrics

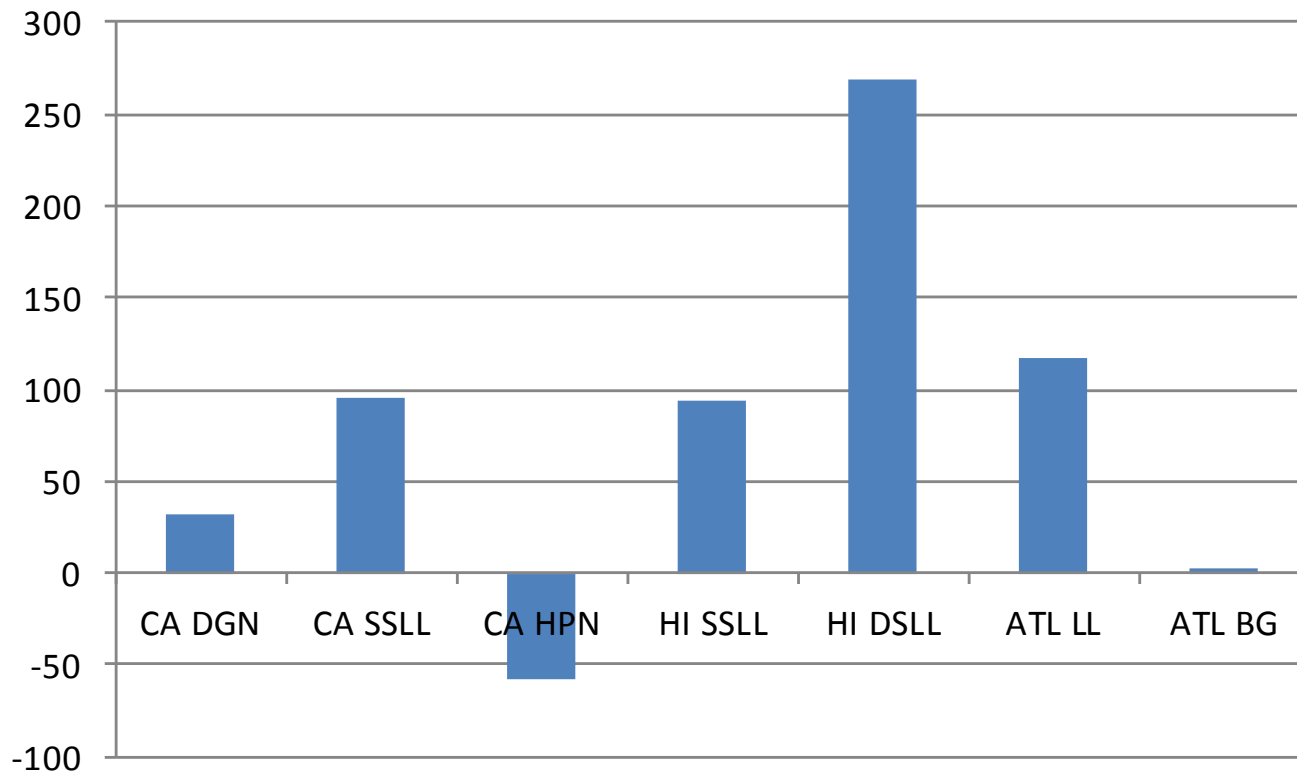
1. Longline fisheries generally produced higher profits than other methods under comparison (Figure 2).
2. Average price per pound of swordfish was higher for CA HPN^S and ATL BG^S than for the high volume methods.
3. Based on available cost data (2008-2010), CA HPN^S has negative values for the three profit metrics.

Commercial Volume Metrics

1. Longline fisheries provided by far the highest commercial volumes of production, both on a fleet and a vessel-level basis (Figure 3).
2. The comparison might be confounded by the areas where the fisheries operate.

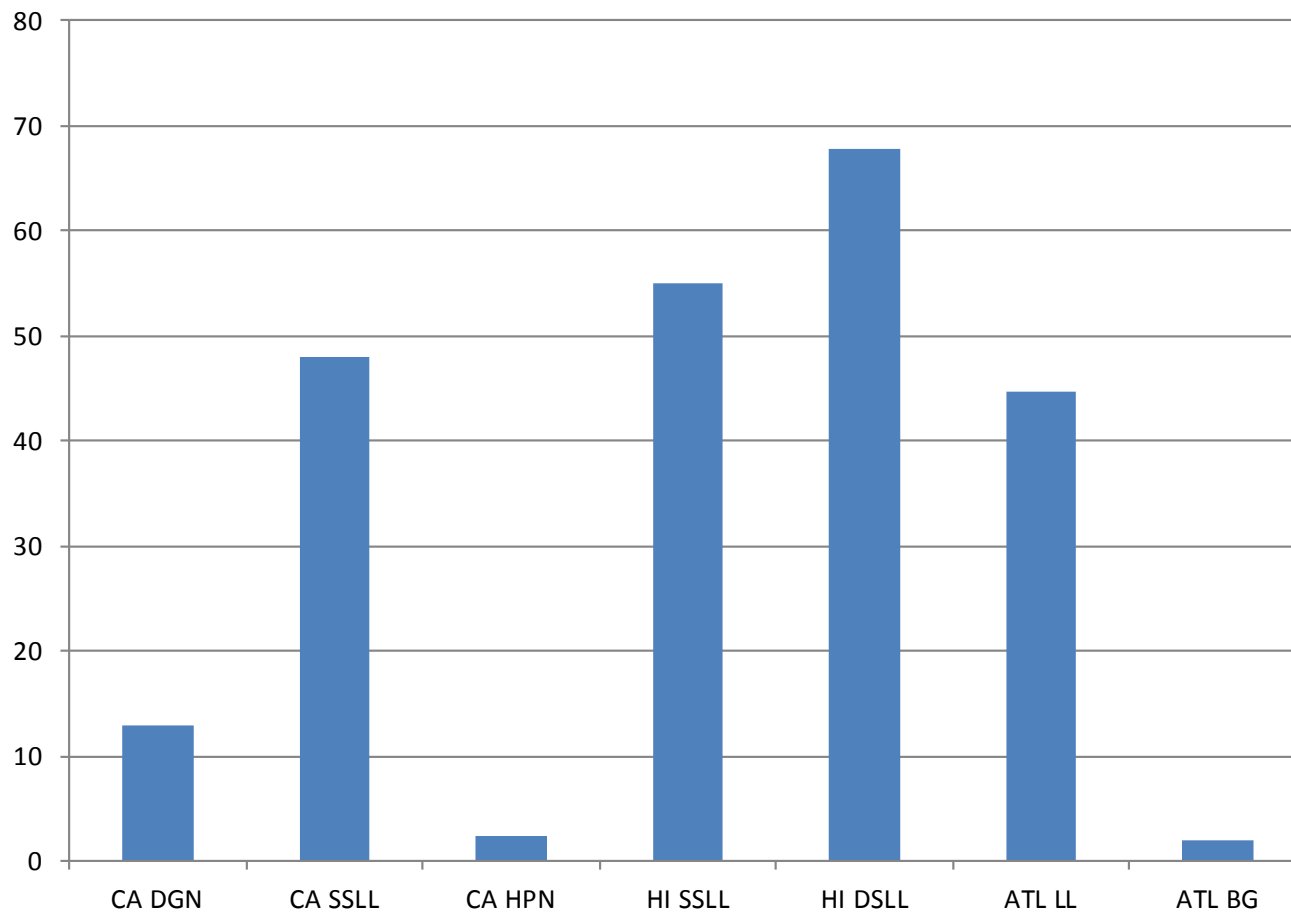
Preliminary Results: Economic Metrics

Figure 2. Average annual profit (2012 \$1000s) per vessel



Preliminary Results: Commercial Volume Metrics

Figure 3. Average annual total landings (mt) per vessel during period



Preliminary Results: General Conclusions (1)

1. The CA DGN^S fishery does not appear to be a high protected species bycatch fishery compared to Hawaii longline or the MSC certified Atlantic longline fishery.
2. Buoy gear appears promising due to higher possible landings, high market prices and lower costs, making it a low-bycatch gear that is economically viable; however it is unlikely on its own to supply a large commercial volume of swordfish to the market. Additional research is on-going to determine the potential volume of fish that could be supplied.

Preliminary Results: General Conclusions (2)

3. Harpoon is an attractive gear in terms of low bycatch, but does not appear capable of supplying commercial volumes of swordfish during years of low abundance or catchability.
4. Pacific longline fisheries rank high in terms of volume of swordfish and all commercial species landings relative to high priority bycatch species, economic measures of revenue and profitability, and production of commercial volumes of landings.

Additional Information on HI SSL Fishery

Average HI SSL landings to the West Coast (round mts)

Period	Annual total	Per vessel-year	Ave # Vessels/year
2005-2009*	66.00	33.00	2
2010-2013	380.75	52.52	7.25

* Excludes 2005 and 2007 from calculations, since no HI SSL landings were made to the West Coast those years

Preliminary Results: Bycatch Metrics

Fishery	CA DGN ^S	CA SSL ^S	CA HPN ^S	HI SSL ^S	HI DSL ^T	ATL LL ^{S-T}	ATL BG ^S
Time period	2001-2012	2002-2004	1995-2011	2005-2012	2005-2012	2005-2012	2007-2012
High priority protected species taken during period	Leatherback, Loggerhead, Sperm whale, Humpback whale, Gray whale	Leatherback, Loggerhead, Olive ridley	None*	Loggerhead, Green turtle, Olive ridley, Humpback whale, Pygmy sperm whale, False killer	Leatherback, Loggerhead, Green turtle, Olive ridley, Sperm whale, False killer whale	Loggerhead, Bottlenose dolphin, Humpback whale, Sperm whale, Killer whale	None
Mt of swordfish landings per number of expected takes of high priority protected species	61.4	6.7	N/A	63.4	3.9	2.6	N/A
Mt of all market species landings per number of expected takes of high priority protected species	118.0	7.2	N/A	81.3	147.1	5.4	N/A
Mt of swordfish landings per number of expected takes of other protected species	2.5	4.4	N/A	15.6	1.0	10.4	N/A
Mt of all market species landings per number of expected takes of other protected species	4.7	4.7	N/A	20.1	37.3	21.4	N/A
Mt of swordfish landings per number of expected takes of all protected species	2.4	2.7	N/A	12.5	0.8	2.1	N/A
Mt of all market species landings per number of expected takes of all protected species	4.6	2.9	N/A	16.1	29.7	4.3	N/A
Mt of swordfish landings per number of expected take of blue sharks	0.2	0.1	N/A	0.1	0.0	0.1	14.8
Mt of all market species landings per number of expected take of blue sharks	0.4	0.1	N/A	0.1	0.2	0.1	15.11

* The harpoon fishery has no observers because it is assumed to have no bycatch. All bycatch rates are presumed to be zero.

Preliminary Results: Economic and Commercial Volume Metrics

Fishery	CA DGN ^S	CA SSSL ^S	CA HPN ^S	HI SSSL ^S	HI DSLL ^T	ATL LL ^{S-T}	ATL BG ^S
Time period	2001-2012, 2008-2010 for cost	1999-2004, 2001-2003 for cost	1995-2011; 2008-2010 for cost	2005-2012; 2008 for cost	2005-2012; 2008-2009 for cost	2005-2012	2007-2012; 2009-2012 for cost
Swordfish revenue (2012 \$1000s) per mt of swordfish landings	5.9	4.5	10.5	5.1	5.9	6.9	8.1
Total revenue (2012 \$1000s) per mt of total landings	4.3	4.5	10.4	4.5	7.0	7.1	7.9
Variable cost (2012 \$1000s) per mt of total landings	2.1	2.6	36.6	2.8	4.1	4.5	5.0
Profit (2012 \$1000s) per mt of total landings	2.2	2.0	-26.3	1.7	2.8	2.6	2.9
Average annual fleetwide profit (2012 \$1000s)	1,221.3	3,384.5	-1,743.3	2,536.2	33,997.6	13,409.6	119.3
Average annual profit (2012 \$1000s) per vessel	31.3	95.3	-58.1	93.6	268.5	116.9	2.4
Average price per pound of swordfish over period (2012\$)	2.67	2.04	4.77	2.33	2.66	3.96	5.33 (2013)
Commercial Volume Metrics							
Time period	2001-2012	1999-2004	1995-2011	2005-2012	2005-2012	2005-2012	2007-2012
Average annual swordfish landings (mt) during period	265	1,496.70	65	1,184.40	229.7	2,489.30	93.51
Average annual swordfish landings (mt) per vessel during period	6.8	44.2	2.2	43.7	1.8	21.7	1.9
Average annual total landings (mt) during period	509.3	1,635.70	70.3	1,490.00	8,571.20	5,113.10	95.7
Average annual total landings (mt) per vessel during period	13	47.9	2.3	54.9	67.7	44.6	1.9