

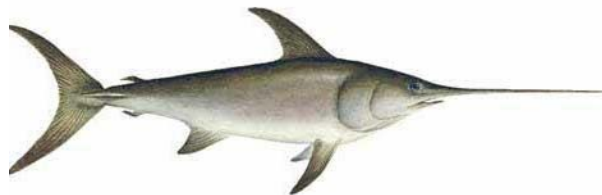
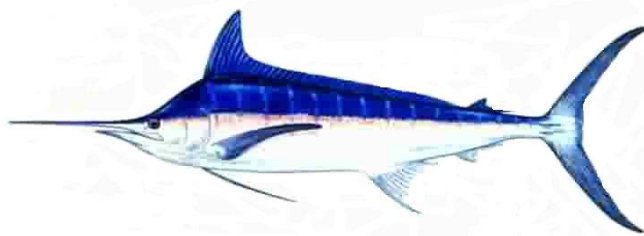


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## **Preliminary economic overview of the swordfish longline fishery in Kesen-numa, Japan**

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## Introduction

The economic analysis of fisheries resources is an indispensable part of fisheries management. The field of economics studies the use of scarce resources in society, which describes fisheries resources (Hannesson 1993). Economic analysis suggests that fisheries resource use can be sustainable and maximized by considering the costs incurred by fishers and management. In other words, the economic analysis of fisheries resources could inform the appropriate scale of fishing activity necessary to achieve a specific management goal. Economic analysis of the billfish fishery in Japan, however, has never been part of fishery management.

Kesen-numa, located on the northern Pacific coast of Honsyu Island, Japan, has a longline fishery which is one of only a few Japanese fisheries targeting swordfish (Figure 1). In the past several decades, the number of active vessels in this area has declined from 41 to 23 due to economic hardships (Table 1). With a rapid rise in the price of fuel, longline operations in Kesen-numa are experiencing a predicament. The necessity of finding a way to make this fishery economically sustainable is urgent. To find a viable solution, it is necessary to initiate an economic study that engages the status of swordfish as a resource (e.g., bioeconomic analysis).

The purpose of this short document is to describe preliminary characters and identify emerging economic issues in the Kesen-numa longline swordfish fishery.

## Longline fishing vessel in Kesen-numa

Since 1953, the offshore and distant water longline fishery in Japan has been a licensed fishery under the Ministry of Agriculture, Forestry and Fisheries (Makino and Matsuda, 2005). The Japanese longline fishery has two main categories, i) distant water (en-you) and ii) off-shore (kin-kai). These categories are strictly based on the holding capacity of a vessel rather than actual distance to fishing grounds. While all longline vessels having more than 120 Gross Registered Tons (GRT) have a distant water longline fishing vessel license, any longline vessel less than 120 GRT and more than 20 GRT have a off-shore longline fishing vessel license (Ministry of Agriculture, Forestry and Fishery, 2005).

Currently in 2008, there are 23 active Kesen-numa longline fishery vessels targeting swordfish and all of them are operating with an offshore longline license. The average holding capacity of these active vessels is 119 GRT which is close to the maximum allowable capacity under this license. The average age of a vessel is 16 years with the maximum being 21 years and the minimum being 12 years.

## Labour issues

A critical issue for all Japanese fisheries, as well as in the Kesen-numa fishery, is that of labour for crew. Due to the high labour cost to employ Japanese crews, most Kesen-numa longline vessels hire foreign crews (e.g., from Indonesia). Yet all vessels are required to hire a Japanese crew for

more than half of all offshore operations and 2/3 of all distant water operations. Furthermore, despite the required heavy and harsh labour, the entry level salary for crew is relatively low at \$1500 - 2000 USD per month<sup>2</sup>. This low salary does not attract young Japanese labour to the Kesen-numa longline fishery. Consequently, it is hard to employ young Japanese labour in the Kesen-numa longline fishery, and the average age of a Japanese crew is currently as high as 51 years old.

## Landings

In 2007, 178 trips were made over 7035 days by 26 vessels. We inferred that the average number of days in a trip was 39.5 (Table 2: Total operations of active off-shore longline vessels in Kesen-numa). With these efforts, 9,458 MT were landed and the total landing value was around \$35.8 million USD. Between 2004 and 2007, the total landings of swordfish fluctuated between 1,726 – 2,223 MT with unit ex-vessel prices between 6,900 -8,200 USD per MT. Swordfish landings made up 47.1-49 % of total landing values for the longline fisheries of Kesen-numa. The major alternative species to harvest instead of swordfish for off-shore longline vessels in Kesen-numa is blue shark. While the landings of blue shark declined from 8,279 MT in 2004 to 5,785 MT in 2007, the unit ex-vessel price has increased 40% from 1,520 USD to 2,120 USD per MT. Although the market structure of blue shark needs to be identified, the increase in the unit ex-vessel price corresponding to a decrease in landings represents the price elasticity of blue shark corresponding to the total quantity landed by off-shore longline vessels in Kesen-numa. The total landings of swordfish and blue shark dominated and were 83-93% of total landings by off-shore longline vessels in Kesen-numa from 2004 - 2007. To visualize the economic incentive of species choice by operators as well as their fishing operations as a whole, in addition to considering swordfish stock, the resource status of blue shark should be considered.

## Market

Currently information on the swordfish market in Japan is limited. The unit-ex vessel price of swordfish between 2004 and 2007 did not clearly infer the price elasticity of swordfish as well as the market structure. Kesen-numa city (1995) reported that 80 % of the swordfish in Japanese markets is from Kesen-numa and that swordfish landing from Kesen-numa dominated the market. This information needs to be verified for a precise quantitative analysis. Furthermore, the dynamics of the swordfish market (e.g., import-export, alternative products interactions) need to be identified in future studies.

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<sup>2</sup> Pers.comm. with vessel owners.

## Operation accounting

Table 4 presents the average vessel accounting of off-shore longline fishing vessels in Kesen-numa between 1994 and 2006. Note that these are nominal values and standardization by the consumer index has not been applied yet. Profit before depreciation fluctuated over time. Between 2002 and 2004, profit before depreciation was a negative value. There was a dramatic change in the number of active vessels from 2003 to 2004 (from 34 vessels to 20 vessels, Table 1). This change may be because of economic hardship that appeared in this accounting data. While the proportion of labour cost out of the total cost was relatively stable (32-39%) between 1994 and 2006, the proportion of the fuel cost increased from 7% to 23%. This rise in fuel cost proportions could be a result of increased oil prices in recent years. Kesen-numa city (2005) reported an expansion of the fishing grounds of off-shore longline fishing vessels from 160E to 160W in recent years. This expansion of fishing grounds may induce a higher consumption of fuel<sup>3</sup>. Again although the source of this report needs to be verified, this would also have resulted in high fuel costs. In future analyses, both the fuel price and the expansion of operations need to be considered.

## Concluding remarks

This short document reviewed currently available operational and economic data for off-shore swordfish longline operations in Kesen-numa. It is clear that this fishery has operational difficulties due to economical hardships. To approach this issue, an economic analysis of the swordfish fishery that corresponds to the stock assessment must be considered. In addition, for the economic analysis to improve operations, field research which includes hearing from fishing operators and processors is necessary to enrich quantitative analysis of the swordfish fishery in Kesen-numa.

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<sup>3</sup> Also they reported the unit ex-vessel of swordfish was decreased because of the degradation of harvest due to the delay of landings. This, however, could not be verified with current available data.

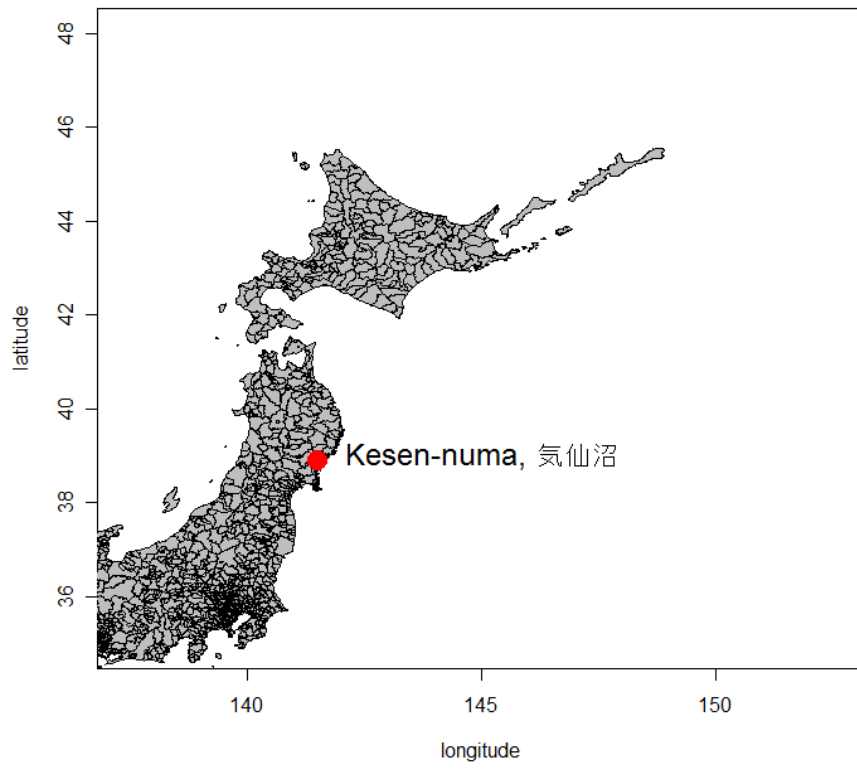


Figure 1: Location of Kesen-numa

**Table 1: Historical changes in the number of firms operating longline vessels for swordfish in Kesen-numa and the number of active vessels (source: Fishery in Kesen-numa, 1997-200.)**

	Number of firms	Number of vessels 20-119 GMT class
1997	34	41
1998	29	38
1999	25	33
2000	26	34
2001	25	33
2002	25	34
2003	25	34
2004	24	20
2005	23	24
2006	25	28
2007	23	26
2008	-	23

**Table 2: Total operations of active off-shore longline vessels in Kesen-numa**

Year	2004	2005	2006	2007
Number of trips	177	172	125	178
Total days of operations	6999	6655	5124	7053
Total landings (MT)	11770.7	12182.5	8897.1	9458
Total landing values (1000 USD)	32,760	35,218	25,448	35,787

Table 3: Landings of off-shore longline vessels in Kesen-numa

		2004	2005	2006	2007
<b>Bluefin tuna</b>	Landing(MT)	10.9	7.8	3.7	2.8
	Unit ex-vessel price (1000 USD/MT)	19.2	20.9	17.1	16.8
	Landing value (1000 USD)	210	162	64	47
	Species landing share in the value	0.7%	0.5%	0.3%	0.1%
<b>Bigeye</b>	Landing(MT)	100.5	59.8	40.6	103.7
	Unit ex-vessel price (USD/MT)	13.4	16.6	18.4	15.4
	Landing value (1000 USD)	1,347	989	745	1,596
	Species landing share in the value	4.4%	3.1%	3.1%	4.3%
<b>Small bigeye</b>	Landing (MT)	12.6	5.5	2.3	5.6
	Unit ex-vessel price (1000 USD/MT)	5.7	6.6	5.9	8.0
	Landing value (1000 USD)	1,343	840	282	4,153
	Species landing share in the value	0.0	0.0	0.0	0.1
<b>Swordfish</b>	Landing (MT)	2,010.5	1,748.2	1,726.4	2,223.3
	Unit ex-vessel price (1000 USD/MT)	<b>7.21</b>	<b>8.48</b>	<b>6.91</b>	<b>8.20</b>
	Landing value (1000 USD)	14,495	14,825	11,927	18,223
	Species landing share in thre value	<b>47.1%</b>	<b>45.7%</b>	<b>49.0%</b>	<b>49.5%</b>
<b>Striped marlin</b>	Landing (MT)	58.5	66.3	59.6	48.4
	Unit ex-vessel price (1000 USD/MT)	4.8	5.3	4.0	4.7
	Landing value (1000 USD)	280	349	237	227
	Species landing share in the value	0.0	0.0	0.0	0.0
<b>Albacore</b>	Landing (MT)	12.8	13.8	7.3	13.0
	Unit ex-vessel price (1000 USD/MT)	2.9	3.0	2.8	2.3
	Landing value (1000 USD)	511	595	299	320
	Species landing share in thre value	1.7%	1.8%	1.2%	0.9%
<b>Blue shark</b>	Landing (MT)	8,279	8,774	6,149	5,785
	Unit ex-vessel price (1000 USD/MT)	<b>1.52</b>	<b>1.67</b>	<b>1.76</b>	<b>2.12</b>
	Landing value (1000 USD)	12,591	14,674	10,804	12,255
	Species landing share in the value	<b>40.9%</b>	<b>45.2%</b>	<b>44.4%</b>	<b>33.3%</b>

Table 4: Average accounting of off-shore longline vessel in Kesen-numa.

	unit	year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Landings	MT		372	358	395	481	510	520	546	496	490	531	506	580	561
Average ex-vessel price	USD/MT		4,505	4,390	4,371	4,010	3,514	3,429	3,286	3,438	3,000	2,648	2,629	2,876	3,000
Total landing values	10,000USD		189	167	172	193	180	178	179	170	148	139	131	166	168
Other incomes	10,000USD		6	9	7	10	6	5	5	4	3	4	4	6	11
<b>Total income</b>	<b>10,000USD</b>		<b>194</b>	<b>175</b>	<b>179</b>	<b>204</b>	<b>186</b>	<b>183</b>	<b>184</b>	<b>174</b>	<b>150</b>	<b>143</b>	<b>135</b>	<b>171</b>	<b>179</b>
Fuel cost	10,000USD		18	17	18	22	19	19	23	25	22	24	25	30	39
Bait cost	10,000USD		30	26	25	24	22	24	24	22	23	22	17	17	15
Gear maintenance	10,000USD		10	10	8	9	10	9	9	8	7	6	5	6	6
Vessel maintenance	10,000USD		13	11	11	13	11	14	13	13	12	13	13	12	13
Ice	10,000USD		2	2	2	2	2	3	3	2	2	2	2	2	2
<b>Total cost for operation</b>	<b>10,000USD</b>		<b>72</b>	<b>66</b>	<b>64</b>	<b>70</b>	<b>64</b>	<b>69</b>	<b>71</b>	<b>70</b>	<b>66</b>	<b>67</b>	<b>62</b>	<b>68</b>	<b>75</b>
Crew share	10,000USD		61	55	56	64	58	58	56	54	47	44	42	48	46
Insurance	10,000USD		10	10	9	10	9	9	10	10	9	9	8	8	7
Food	10,000USD		8	8	7	7	7	7	7	7	7	7	6	5	5
<b>Total labour cost</b>	<b>10,000USD</b>		<b>79</b>	<b>72</b>	<b>71</b>	<b>80</b>	<b>73</b>	<b>73</b>	<b>72</b>	<b>70</b>	<b>62</b>	<b>59</b>	<b>55</b>	<b>60</b>	<b>57</b>
Landing fee	10,000USD		7	6	6	7	6	6	6	6	5	5	5	6	6
Promotion	10,000USD		10	11	9	6	7	8	10	10	9	9	9	11	10
Depreciations	10,000USD		55	43	34	27	21	17	13	10	9	8	6	5	4
Interest/loan payments	10,000USD		13	12	10	10	8	5	6	4	3	3	3	2	2
Others	10,000USD		9	7	7	13	11	10	9	10	10	10	6	8	15
<b>Total business cost</b>	<b>10,000USD</b>		<b>93</b>	<b>79</b>	<b>66</b>	<b>62</b>	<b>52</b>	<b>45</b>	<b>43</b>	<b>39</b>	<b>34</b>	<b>33</b>	<b>28</b>	<b>31</b>	<b>37</b>
<b>Total cost</b>	<b>10,000USD</b>		<b>245</b>	<b>217</b>	<b>201</b>	<b>211</b>	<b>190</b>	<b>187</b>	<b>187</b>	<b>179</b>	<b>162</b>	<b>159</b>	<b>145</b>	<b>159</b>	<b>170</b>
Difference	10,000USD		- 50	- 42	- 22	- 8	- 4	- 4	- 3	- 5	- 11	- 16	- 10	12	10
Profit before depreciation	10,000USD		5	1	12	19	17	13	10	6	3	9	4	17	13
<b>Fuel cost (%)</b>			0.07	0.08	0.09	0.10	0.10	0.10	0.12	0.14	0.14	0.15	0.17	0.19	0.23
<b>Labour cost(%)</b>			0.32	0.33	0.36	0.38	0.39	0.39	0.39	0.39	0.38	0.37	0.38	0.38	0.34
<b>Bait cost(%)</b>			0.12	0.12	0.12	0.11	0.12	0.13	0.13	0.12	0.14	0.14	0.12	0.11	0.09