19TH WORKING PARTY

ON DATA COLLECTION AND STATISTICS

(WPDCS19)

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An update on the Data Collection and Statistics System of the Sultanate of Oman

12 November 2023

SUMMARY

1. Introduction

Oman is rich in diverse aquatic ecosystems, with abundant seas, making fishing a major occupation in the country throughout its history. The majority of coastal residents are engaged in this profession, making artisanal fishing fleets the largest contributors to the nation's fish production and a primary source of income for many fishermen. Consequently, Omani authorities have shown great interest in sustaining and conserving this activity. As a result, Oman has joined several regional and international organizations concerned with fisheries.

Statistical fisheries data collection in Oman began in 1984, as part of a joint Omani-American committee established during that period to foster cooperation between the two countries. These early statistics laid the foundation for the methodologies based on a sampling approach to estimate the total production of the Sultanate by region, fish species, and months. This effort also included financial resources, human capabilities, and technical systems for data collection and storage. Many fisheries statistics personnel received specialized training both within Oman and abroad.

Over time, experts in fisheries statistics have implemented monitoring programs for marine catch statistics that have gone through multiple stages of development and improvement. Currently, the program relies on a robust infrastructure that includes human resources for data collection, processing, and analysis, advanced data collection systems, and well-structured databases. Additionally, statistical tools and techniques have been introduced to assess the current statistical and computational practices and verify statistical results through parallel methodologies. Automatic diagnostic procedures have been introduced to provide regular indicators related to data consistency and reliability.

These programs aim to identify potential problems and implement corrective actions when necessary. Intensive training programs have also been developed, focusing on practical marine statistics to address current needs for accuracy, inspection, and changes. Several of these programs were executed: Athens in July-August 2010, University of Reading in England from May 28 to June 6, 2013, and in the Netherlands.

Context of this update on the data collection and statistics system of Oman

Analytical studies have been conducted to identify any statistical gaps or implementation obstacles related to the sampling approach used in artisanal fishing, and these will be the focus of this article, as will be discussed below.

As the Sultanate of Oman endeavors to transition into a developed nation, it has laid down an economic blueprint that aspires to create a productive and diverse economy. This vision is anchored in the principles of innovation, the integration of various roles within the economy, and the provision of equal opportunities for all. The ultimate goal is to foster inclusive growth that is sustainable over the long term, ensuring that the benefits of development are widely shared across society.

With an extensive coastline stretching for 3,165 kilometers, Oman is uniquely positioned to capitalize on its marine resources. The fisheries sector stands out as a cornerstone of the Omani economy, not only as a critical source of income but also as a cultural mainstay. For many individuals and businesses residing along the coastal regions, fishing is more than just a livelihood; it represents a way of life and sustains a rich maritime heritage.

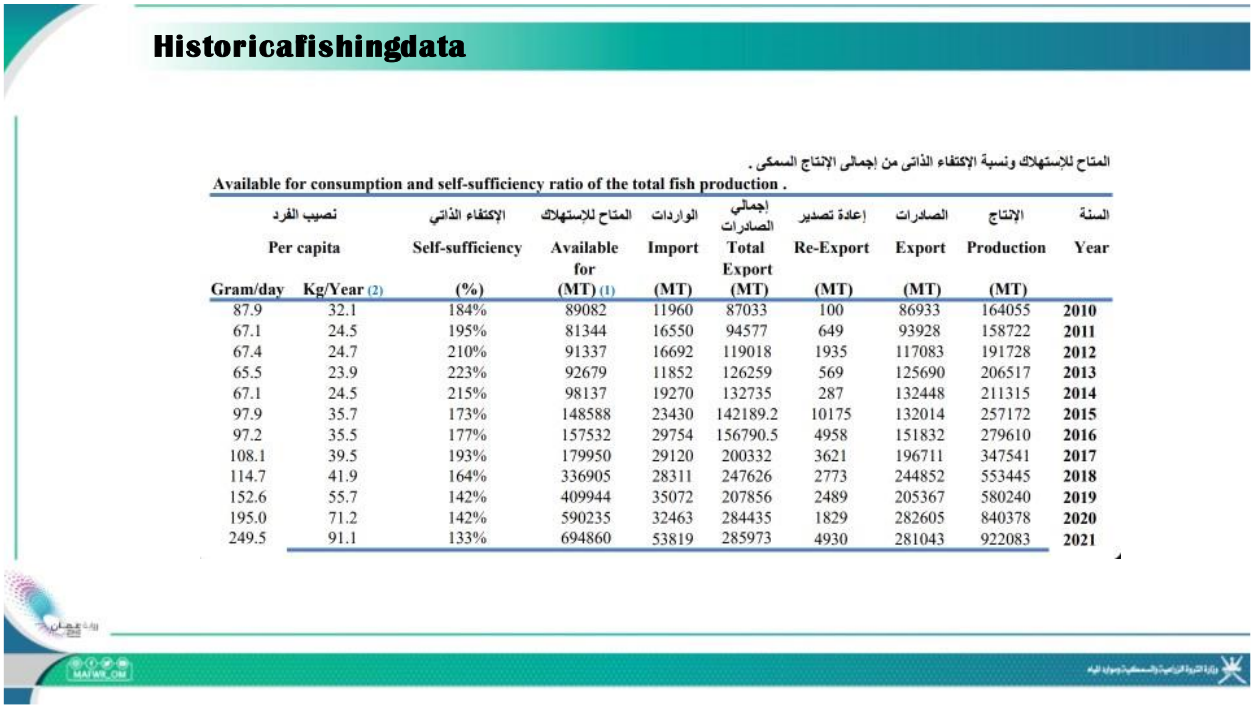
Recognizing the sector's significance, Oman is witnessing the rise of an emerging industry within the fishing sector. This includes the development of processing and canning factories, which add value to the raw marine products harvested from the sea, and aquaculture projects, which aim to cultivate fish and seafood in a controlled environment, contributing to food security and diversification of marine resources.

In line with these developments, Omani fishermen are becoming increasingly professional, adopting more sophisticated fishing techniques and practices. There is a concurrent push to modernize the fishing fleet to meet the demands of a growing market and enhance the efficiency of operations. However, Oman is committed to balancing modernization with sustainability. The principle of sustainable fishing activity is paramount, ensuring that marine ecosystems are preserved for future generations while allowing the current population to benefit from the ocean's bounty.

In this transformative period, Oman's approach is to harness the potential of its fisheries sector in a way that is both environmentally responsible and economically viable, aiming to create a legacy that supports both the nation's prosperity and the conservation of its natural resources.

2. IOTC's proposed Support Mission to Oman

Not only the IOTC but before FAO inquired via email regarding the fishery and aquaculture statistics of Oman for the year 2020. Those were the figures reported by Oman:



تصيب الفرد Per capita Gram/day	Kg/Year (2)	الإكتفاء الذاتي Self-sufficiency (%)	المتاح للإستهلاك Available for (MT) (1)	الواردات Import (MT)	إجمالي الصادرات Total Export (MT)	إعادة تصدير Re-Export (MT)	الصادرات Export (MT)	الإنتاج Production (MT)	السنة Year
87.9	32.1	184%	89082	11960	87033	100	86933	164055	**2010**
67.1	24.5	195%	81344	16550	94577	649	93928	158722	**2011**
67.4	24.7	210%	91337	16692	119018	1935	117083	191728	**2012**
65.5	23.9	223%	92679	11852	126259	569	125690	206517	**2013**
67.1	24.5	215%	98137	19270	132735	287	132448	211315	**2014**
97.9	35.7	173%	148588	23430	142189.2	10175	132014	257172	**2015**
97.2	35.5	177%	157532	29754	156790.5	4958	151832	279610	**2016**
108.1	39.5	193%	179950	29120	200332	3621	196711	347541	**2017**
114.7	41.9	164%	336905	28311	247626	2773	244852	553445	**2018**
152.6	55.7	142%	409944	35072	207856	2489	205367	580240	**2019**
195.0	71.2	142%	590235	32463	284435	1829	282605	840378	**2020**
249.5	91.1	133%	694860	53819	285973	4930	281043	922083	**2021**

They highlight a notable increase in Oman's fish reported catches for the year 2020, which reached record levels of over 840,000 tons, representing a significant 45% increase compared to reported catches of the previous year and continuing a rising trend observed since 2017.

Detailed within the email were species reported catch data over several years, showing substantial growth. For instance, reported catches of small pelagic such as Indian Oil Sardine (IOS) escalated from 82,654 tons in 2015 to 430,243 tons in 2020, with a pronounced 56% increase from 2019 alone. Similarly, Yellowfin Tuna (YFT) reported catches surged from 14,957 tons to 68,815 tons in the same timeframe, marking an 86% jump from the preceding year. Additionally, reported catches of Jacks and crevalles nei (TRE) expanded from 11,021 tons to 64,656 tons, a 67% increase from 2019 to 2020.

FAO inquired into the factors contributing to this surge in reported catch figures of year 2020. They posed questions regarding the extent to which these increases are attributable to enhancements in data collection procedures or if they reflect actual growth in capture production quantities. The email sought to determine if there was any documentation or published material that could shed light on any improvements made in the data collection system. Furthermore, if the data indicated a genuine and substantial rise in reported catches, particularly for yellowfin tuna, FAO requested additional

information that could explain the increase, given the sensitivity surrounding yellowfin tuna stocks due to overfishing concerns.

Regarding the FAO inquiries, Oman made inclusive review of its data collection and statistical system to solve some issues related to landing coverage especially on sampling of fishing units (type catch and effort) at any time 24 7 and at any landing places that could easily explain Oman s recent increase in total reported catches.

In fact, Oman had started from 2017 to collect auxiliary data to cover purchases made by fish factories and companies from local fishermen, both on small and large pelagic including tuna species. The step was important and parallel with results from some initiatives raised from fisheries wealth (one of the main sectors contributes to diversifying sources of income) laboratories conducted in 2017 especially those allowing few licenses for fish meal and oil factories in Arabian Sea.

Where fishing for fish used in fish meal and oil industry, including types of sardine depends on fishing units that are difficult to track and take their data, especially with the extension of the coasts of the Arabian Sea and none existing of landing time regulation.

Besides that, there have been across the years and increase in the capture production quantities of small and large fish in Arabian Sea, sardines at top list, and there were many reasons caused the increasing of the inquired species in terms of their reported landings:

1 First, Existence of good markets nearby, especially after 2016 where fish meal and oil factories have been established.

2 Secondly, the fishermen community in Al Wusta Governorate had an old tradition for not targeting this species, however, recently with availability of markets they started catching them.

3 Also, the increase in the yellowfin production quantities resulted also from an increase in CPUE naturally, the close explanations of this may be due to nature of these migratory species and the targeting of fishing fleets during their migration.

In July 2022, as follow up of the IOTC WPDCS and Scientific Committee (2019-2021); and by the Commission at its 26th session (2022), the IOTC Secretariat, in the framework of capacity building actions, proposed support mission mainly to request clarifications on the substantial increases in tunas reported by Oman in 2020. The objectives of the mission were to:

a) Provide an overview of Oman's current compliance level with IOTC data reporting requirements.

b) Improve the understanding of the composition and characteristics of Omani fisheries catching tuna and tuna-like species and ensure these are mapped correctly to the standard fishery classifications.

c) Follow up on the implementation of national activities identified by the previous workshop delivered by IOTC and FAO in September 2019.

d) Provide clarification on any outstanding aspects of the IOTC data reporting process and propose potential improvements to increase the efficiency of data reporting to IOTC.

e) Better understand the factors influencing the recent increasing trends in reported catches of yellowfin tuna, including the tools and methodologies being used by the Department of Fishery Statistics to produce official catch estimates.

f) Identify any scientific information on IOTC species being held by national institutions that may currently not be available to the Commission and determine whether such information might be shared.

On 25 August 2022, Oman wrote a communication to IOTC Secretary providing the reasons to decline such an invitation of a support mission.

It is also important to highlight that Oman had recently took advantage of the positive results of different Workshops and capacity building and training sessions received by Oman across the years, in particular, the last one that took place in Muscat in September 2019 (Workshop on IOTC Data Reporting Requirements). Some key points of those workshops are detailed hereinafter in this report.

As described below, Oman's large artisanal fleet is particularly targeting on tuna species, the relevant increase of reported catches has affected not only to tuna and tuna like species, but to all type of fish.

الصيد الحرفي والساحلي والتجاري والإستزراع السمكي : إجمالي الإنتاج بالطن حسب النوع خلال الفترة من٢٠١٢ الى ٢٠٢١م

Artisanal, Coastal ,Industrial Fishery & Aquaculture: Total Landing (mt) by species from 2012 to 2021.

Years / Species	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	السنوات / النوع
Large Pelagics											**الأسماك السطحية الكبيرة**
Yellowfin tuna	5582	7769	7606	14957	20859	19407	28601	37074	68815	71676	جيذر
Longtail tuna	14287	12976	11161	13954	14542	20894	16613	14684	27228	28163	سهوة
Kawakawa	4608	4320	4034	4900	5555	7818	9501	6702	8141	7351	صدة
Striped bonitto	501	307	1143	4545	4574	1695	2195	1078	1495	2149	سقطانة
Frigate tuna	944	1014	395	684	1078	1184	2186	1130	2457	6368	تبانة
Skipjack	100	8	23	16	216	55	206	102	436	229	حقيبة
Other tuna	1225	522	739	1619	397	1288	1159	2576	9442	11380	تونات اخرى
Kingfish	5620	4176	4979	3992	7011	3341	2601	2098	5913	7667	كنعد
Queenfish	4244	2782	3531	3550	3005	3876	5432	5340	3336	5014	حبس
Baracuda	4002	4259	4284	6808	6087	9476	10972	10890	7453	7979	عقام
Cobia	128	124	185	165	196	229	260	173	204	223	سكل
Sailfish	3521	3117	1129	2251	1763	1633	1864	1495	2658	2883	ميخ
Large Jacks	9328	8350	8306	8277	9194	7397	16523	15177	18409	21526	صال كبير
Other	1041	4647	1949	2503	2421	4878	3668	17061	12202	15388	اخرى
Subtotal	**55131**	**54371**	**49465**	**68220**	**76898**	**83174**	**101783**	**115578**	**168189**	**187997**	**اجمالي**

On the other hand, **with due respect to all CPCs**, it is important to highlight that Oman was surprised for such as a request of a support mission to query about the relevant increase of reported catches of yellowfin tuna, when in recent years, **several CPCs also sharply increased the reporting of catches of yellowfin tunas and no other CPCs, Working Groups or Committees or even the Commission, raised any request for information or any type of concern to identify the reasons of those increases**. The below table is self-explanatory:

YEAR	MALDIVES	OMAN	Seychelles	INDIA	KOREA	SPAIN	FRANCE	JAPAN	PAKISTAN	IRAN	CHINA	INDONESIA
1979	5.128	4.069	128	3.683	18.129			3.398	2.762	755		4.353
1980	5.082	5.035	357	3.393	13.299			3.358	1.275	604		5.358
1981	6.251	4.768	949	3.061	12.427	363	188	4.949	1.958	227		6.203
1982	4.814	3.505	518	4.403	19.531	55	1.081	7.400	2.450	506		7.561
1983	7.981	1.564	157	1.926	16.394		10.400	7.991	827	478		5.535
1984	8.486	4.586	131	2.629	10.287	11.453	39.269	8.145	893	491		5.674
1985	7.136	2.249	177	7.250	12.597	18.420	37.706	9.540	1.487	489		5.838
1986	6.353	2.534	10	3.280	15.660	20.017	40.947	10.864	2.517	643		6.145
1987	7.595	5.874	8	5.604	13.298	26.258	41.012	8.570	2.449	935		6.858
1988	6.218	15.575	3	3.032	14.217	44.928	56.765	9.645	3.894	1.011		9.068
1989	5.776	16.348		4.408	8.676	41.070	33.547	5.475	8.568	980		11.303
1990	5.140	14.498	15	6.097	7.476	43.711	45.351	9.309	3.341	2.280		10.406
1991	7.227	9.170	372	4.309	3.216	44.023	38.135	9.450	6.692	3.238		12.343
1992	8.309	13.695	225	3.096	4.437	37.836	45.282	17.715	23.402	13.951		15.560
1993	9.605	11.855		6.340	4.343	47.802	39.539	16.676	30.817	20.646		20.049
1994	12.621	19.370	8	5.161	3.876	43.149	35.819	15.057	4.604	26.356		24.964
1995	12.031	21.477	5	8.542	2.592	65.143	39.635	12.778	5.140	25.907	209	27.118
1996	11.811	11.708	71	6.779	3.766	59.431	35.577	16.727	3.005	30.234	711	43.759
1997	12.489	9.980	2.882	6.575	3.976	60.986	31.227	18.216	5.414	22.024	970	50.631
1998	13.566	11.415	7.460	7.510	2.554	38.588	22.382	18.753	6.197	21.534	680	46.660
1999	13.261	7.433	9.949	8.978	1.016	51.919	30.799	16.166	11.600	27.085	2.734	53.121
2000	11.625	8.634	11.885	6.772	1.963	49.512	37.694	16.431	9.378	15.743	2.597	40.994
2001	13.656	8.051	13.436	4.256	1.562	47.734	31.252	14.543	11.266	20.153	1.834	39.797
2002	20.610	7.130	17.139	7.208	348	53.532	34.567	14.378	11.621	24.045	1.358	34.639
2003	18.833	10.286	34.733	6.788	2.160	78.968	63.101	17.810	12.219	37.722	2.300	30.839
2004	21.404	25.317	52.843	11.542	4.173	80.820	63.174	16.361	13.541	50.720	3.781	30.387
2005	20.513	22.015	44.821	15.657	3.517	77.546	57.198	22.386	16.227	43.185	4.260	31.405
2006	21.772	18.455	31.036	17.578	3.444	71.076	44.495	22.616	18.307	39.521	3.857	24.787
2007	20.663	19.271	18.352	21.430	3.589	37.849	32.660	19.555	13.702	15.845	2.826	29.835
2008	22.609	21.045	21.348	16.349	1.011	46.161	37.643	11.656	15.561	18.729	898	29.909
2009	19.611	7.991	21.901	15.844	969	33.607	22.192	5.435	13.492	20.757	453	26.735
2010	21.068	3.255	26.002	21.216	702	45.298	22.599	3.820	16.204	30.876	496	29.289
2011	34.941	7.283	26.494	22.343	235	52.350	21.201	4.893	15.645	26.740	191	33.550
2012	44.261	7.803	28.406	32.187	1.777	57.925	23.732	3.562	16.261	34.965	538	31.293
2013	45.859	8.655	27.543	34.618	3.235	68.664	21.671	4.253	15.768	32.403	922	32.807
2014	49.212	7.208	25.079	33.427	10.409	58.229	33.513	4.072	16.441	46.216	1.078	25.275
2015	52.439	15.183	41.468	17.159	9.183	52.885	31.047	3.478	18.817	42.599	1.793	25.945
2016	53.705	20.983	43.261	19.244	11.721	51.660	33.719	3.389	25.560	45.110	1.812	22.636
2017	49.361	19.499	46.056	13.932	8.164	54.596	29.962	4.003	27.784	56.121	2.962	22.162
2018	47.217	28.837	42.051	37.488	6.990	45.369	30.057	3.382	18.384	58.650	4.641	22.635
2019	44.702	37.033	41.497	33.554	10.790	42.318	27.206	2.597	9.358	58.044	3.212	35.567
2020	42.705	68.785	38.250	20.795	3.687	44.260	24.524	2.085	7.919	48.314	3.707	36.517
		71.600										

Across the years, there have been other relevant CPCs such as Maldives, Seychelles, France, Iran, Korea, also notified to the IOTC huge increases of reported catches of yellowfin tunas in 2014, (also Mauritius in 2017).

3. Oman's active participation in Technical Workshops on data collection and statistic

3.1 Regional Observer Scheme Evaluation, Training and Planning Workshop

The 16th session of the IOTC Scientific Committee, held in 2013, made a number of recommendations related to training and capacity building to support data collection and bycatch mitigation for gillnet fleets.

A workshop aimed to fulfil the requests of the SC took place in 2014 to improve data reporting by supporting the implementation of the Regional Observer Scheme. It comprised an interactive workshop for fisheries staff working on the gillnet fleets of I.R. Iran, Oman and Pakistan. In this meeting, Oman reported:

> *Mr Yasser Abdullah Saif Al-Mushli gave a presentation providing some background information on the tuna fisheries of Oman. The majority of the fleet comprises artisanal vessels (98%), with smaller coastal (1%) and commercial (0.8%) fisheries as well as some aquaculture (0.2%). The artisanal vessels are made up of ~20,000 skiffs undertaking day trips, and ~700 dhows (9-24m length) undertaking longer trips of 1-10 days duration. There is currently little information on where the dhows are fishing so there are plans to implement GPS surveillance onboard these vessels in the near future.*
>
> *To date no onboard observer scheme has yet been implemented in Oman, however a port sampling system has been established comprising 42 data collectors who cover over 156 landing sites. The data collection system is designed to record fish species and weights as they are landed but does not include more detailed information such as length data. An electronic tablet data recording system is used which has an inbuilt catalogue of species which can be used for identification during data collection and this system is reported to have improved the detail of information reported.*

This shows efforts by Oman to enhance fishery data collection and bycatch mitigation, including the implementation of a port sampling system and plans to improve GPS surveillance on fishing vessels.

3.2 FAO technical workshop on global harmonization of tuna fisheries

Another workshop brought together representatives of 8 CWP parties namely: CCSBT, FAO, GFCM, IATTC, ICCAT, IOTC, SPC, and WCPFC. Two representatives of fisheries department on statistics from Oman and Trinidad and Tobago joined the workshop as CWP observers to present the importance of data harmonization process and on facilitating the multi-reporting of fisheries statistics. The Workshop consisted of 6 sessions covering inter alia Harmonization of reference data and grid system, data collection programs, data exchange and Update of the FAO global Tuna Atlas. minutes reflect interesting details:

Oman (IOTC-2018-SC21-NR19)

The total production of the Omani fishery sector amounted to around 348,000 Tons in 2017 with an increase of approximately 24% compared to 2016.

Tuna species considered as highly valuable products for Omani consumers, have experienced significant increases in the total annual production and increasing (for Tuna and Sharks species) from 47,517 mt in 2015 to 54,824mt in 2016 and to 57,426 mt in 2017. This increase finds its origin, in the dynamism shown by the traditional fleet on the tuna coastal resources and probably the slowdown of the fishing pressure in the Yemen waters. For the industrial fleet, the number of vessels decreased from 10 vessels in 2011 to 3 vessels in 2014 and to 1 vessel in 2017. This reduction in the industrial fishing capacity was initiated by the national Authorities for the purpose of restructuring the industrial fishing sector to improve its competitiveness and efficiency. At the annual IOTC meeting in 2018, the Sultanate has submitted a revised version of its Fleet Development Plan which is scheduled to be implemented in the upcoming years. Artisanal and coastal fleets have, however, increased slightly in the number of vessels and fishermen.

For the monitoring aspects of the Tuna fishery, the Omani Government has introduced the logbook data collection scheme, the Vessel Monitoring System (Upgrading the system is ongoing), Port Sampling Program (PSP), and a scheme to enhance the quality of data gathered in order to contribute to manage and sustain efficiently the Omani fisheries.

At the same time, the Government started to run and monitor several other projects for other marine species such as sea birds and marine turtles. While the sea birds program is still in its starting stages, the turtle program has been launched and several assessment missions and reports have been completed and multiple public awareness sessions and fishermen sensitisation programs have been executed particularly in Massirah Island. A very informative conference has been organized in October 2018 by the Environment Society of Oman during which the status of loggerhead sea turtles has been presented and discussed by a large audience of Government participants and other concerned stakeholders.

3.3 FAO and IOTC missions to Oman September 2019 - Workshop on IOTC Data Reporting Requirements September 22nd – 26th 2019

The workshop was organized with key objectives aimed at enhancing Oman's capabilities in reporting statistics of tuna and tuna-like species to the Indian Ocean Tuna Commission (IOTC). One of the primary goals was to assess the current data collection and processing systems in place that are used to produce yearly statistics for tuna and tuna-like species. Additionally, the workshop aimed to identify any gaps in data reporting and propose actionable steps to address these deficiencies.

As a result of the workshop, **several outcomes were achieved**. **Participants received detailed briefings on all the currently binding IOTC resolutions and requirements. This knowledge is crucial in ensuring that Oman's statistical systems are in line with international standards. The workshop also provided an assessment of Oman's statistical systems, highlighting areas where potential improvements could be made to meet IOTC requirements. Furthermore, it was an opportunity to identify sources of previously unreleased information, which led to the sharing of best practices for more detailed and fine-grained data collection.**

In terms of issues identified in 2019, the workshop brought to light lack of information, particularly geospatial data and gear definition, within the current output of Oman's processes for IOTC reporting. It was also noted that there was no fully enforced logbook system at the national level for fleet segments that should implement it, as mandated by IOTC resolution 15/01. This gap in the enforcement of a logbook system was an issue that needed to be addressed to improve the accuracy and reliability of data reporting for fisheries management.

PROPOSED ACTIONS

To effectively address the gaps in Oman's data reporting for the Indian Ocean Tuna Commission (IOTC), several proposed actions were outlined below:

Improvement of Reporting Procedures

To tackle the issue of lacking information, such as geospatial data and gear definition, in Oman's IOTC reporting process, an enhancement of reporting procedures is necessary. This can be achieved by:

- Extending the outputs of the statistical system to include all missing information required for comprehensive IOTC reporting. This encompasses compliance and enforcement data as well as nominal catches.

- The IOTC Secretariat could be provided with a copy of Oman's current database and its associated procedures. The Secretariat could then propose modifications to these procedures, which would need to be recognized and implemented by Oman's Ministry of Agriculture and Fisheries (MAF) Fisheries Statistics.

- Alternatively, MAF Fisheries Statistics could initiate a collaborative process with the IOTC Secretariat to identify and execute all necessary changes in an iterative manner over time.

Vessel Monitoring System (VMS) in Oman

Oman has made significant strides in monitoring fishing activities through the implementation of the VMS. This system has seen several iterations:

- The Fishing Monitoring Centre (FMC) was established in 1999, initially utilizing ELSA for receiving Argos Data until 2007.

- META system, which received both Argos and Iridium data from 2008 to 2018.

- The adoption of THEMIS, a comprehensive fishing management software that has been operational since 2018, capable of receiving data via satellite, GPRS, AIS, and IoT technologies.

The 2021 project plan for the VMS in Oman includes:

- Phase 1 (Installation):

  - Installation of VMS NEMO devices on coastal and dhow vessels.

  - Installation of VMS MARGE V3 on commercial vessels, aiming for 100% coverage of commercial vessels, 80% coverage of coastal vessels, and 55% coverage of dhow vessels, excluding skiffs.

- Phase 2 and Phase 3 (Reviewing, Valuation, and Integration):

  - After the VMS system is fully implemented, a phase of review and evaluation will commence (Phase 2).

  - Integration of the VMS system with the statistical system is part of a future plan (Phase 3).

Logbook System Implementation

Recognizing the issue that no logbook system was fully enforced at the national level, the following actions were suggested:

- Clarify the reasons that are preventing the full implementation of logbooks for coastal fisheries.

- Amend the current legal framework to progressively extend the requirement of logbook use to other sectors, including dhows.

- Seek additional support, potentially from IOTC or the Food and Agriculture Organization (FAO), for the technical rollout of logbooks, taking inspiration from successful implementations in other regional countries, such as Sri Lanka.

Oman's Plan for E-Logbook Development

Oman has implemented a plan to develop an electronic logbook as a tablet application to encompass statistical data collection:

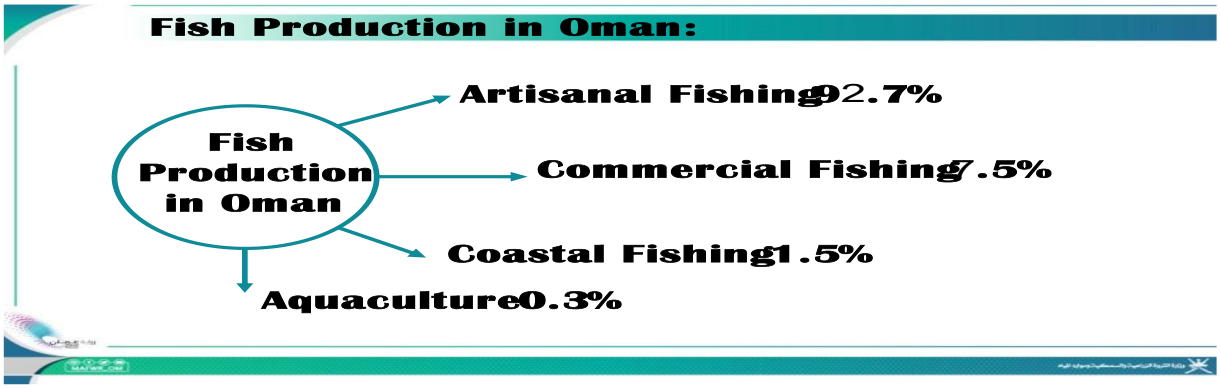
- This plan involves the creation of an electronic platform for an e-logbook that would cover comprehensive statistical data.

- There is an acknowledgment of the challenges in implementing data recording systems on fishing vessels under 24 meters, indicating a need for tailored solutions for smaller vessels.

4. Fish production and fishing fleets active in Oman

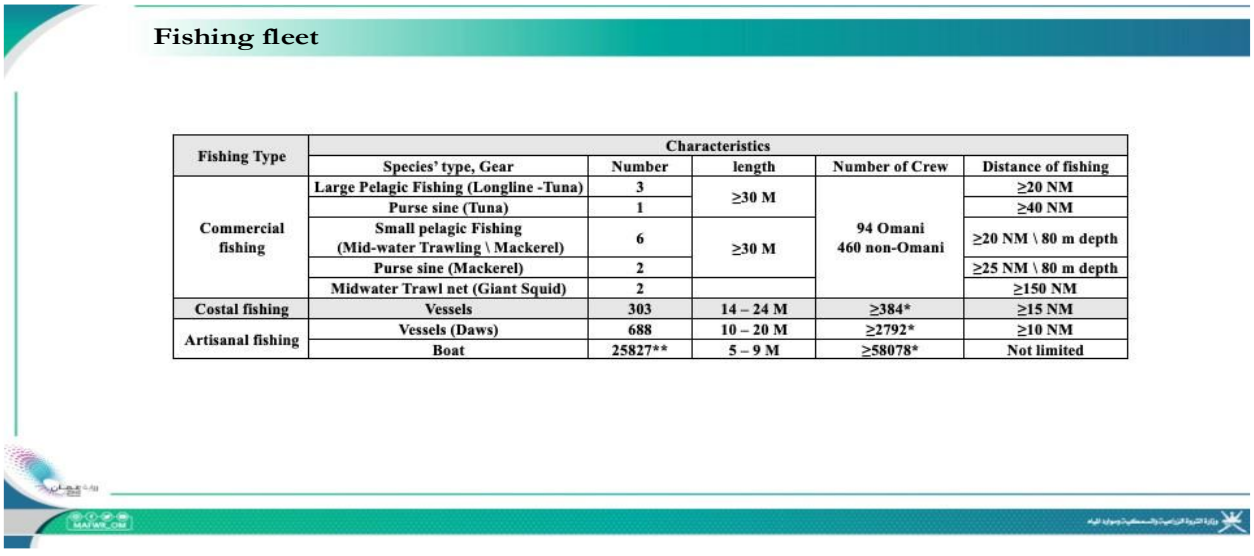
Oman has an increasing diverse fishing fleet, with a substantial number of fishermen employed in coastal and longline fishing operations.

The majority of fish production in Oman comes from Artisanal Fishing, which accounts for 92.7%. Commercial Fishing makes up 7.5% of the fish production. Coastal Fishing has a smaller share at 1.5%, and Aquaculture represents the smallest portion, at only 0.3% of the fish production. Fishing Ports: Oman has 24 fishing ports, which are locations designated for landing and distributing fish.



The total number of fishermen engaged in the industry was more than 60,000 in 2021, indicating the human resource involved in Oman's fishing sector.

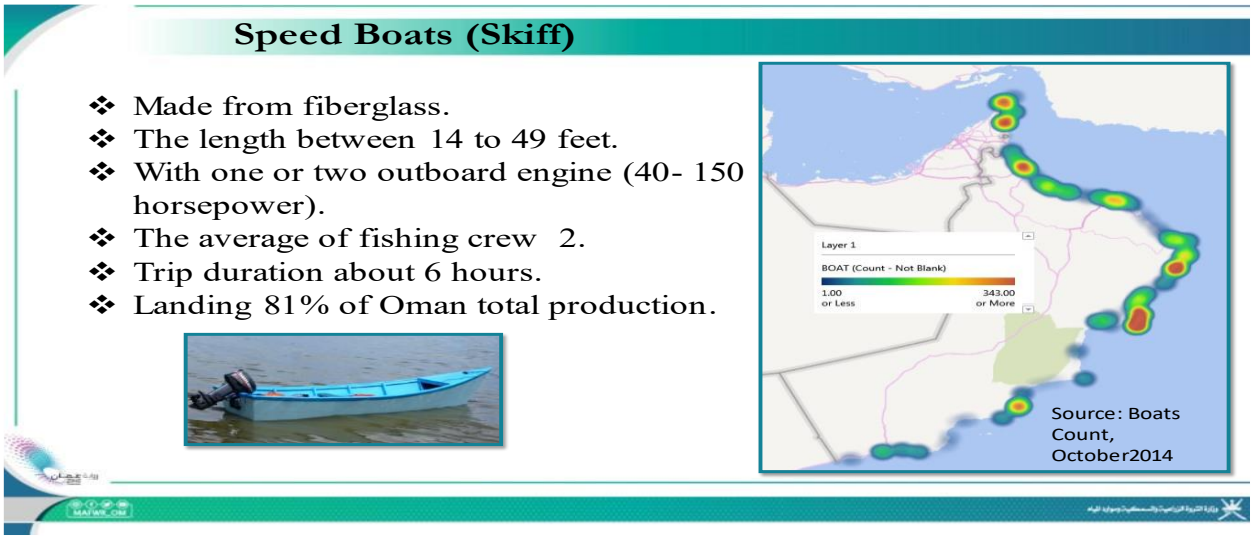
Type of fleets



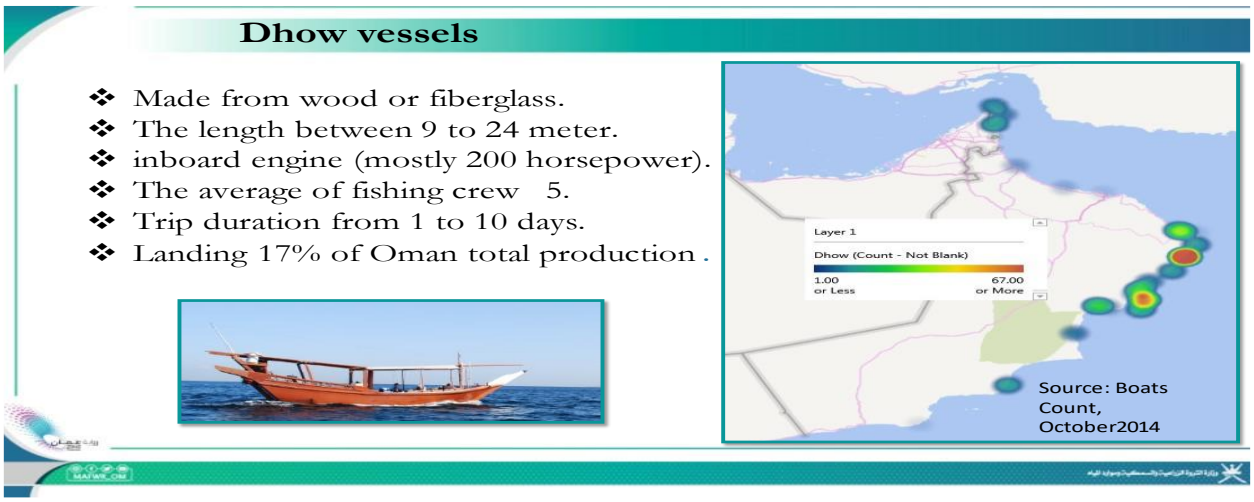
Fishing Type	Characteristics				
	Species' type, Gear	Number	length	Number of Crew	Distance of fishing
Commercial fishing	Large Pelagic Fishing (Longline -Tuna)	3	≥30 M	94 Omani 460 non-Omani	≥20 NM
	Purse sine (Tuna)	1			≥40 NM
	Small pelagic Fishing (Mid-water Trawling \ Mackerel)	6	≥30 M		≥20 NM \ 80 m depth
	Purse sine (Mackerel)	2			≥25 NM \ 80 m depth
	Midwater Trawl net (Giant Squid)	2			≥150 NM
Costal fishing	Vessels	303	14 – 24 M	≥384*	≥15 NM
Artisanal fishing	Vessels (Daws)	688	10 – 20 M	≥2792*	≥10 NM
	Boat	25827**	5 – 9 M	≥58078*	Not limited

Artisanal fleet: is dominated by skiffs which are small boats typically used for coastal or artisanal fishing. Made from fiberglass. The length between 14 to 49 feet. With one or two outboard engine (40 150 horsepower). The average of fishing crew is 2. Trip duration about 6 hours. Landing 81 % of Oman total.

Artisanal Boat



Dhows: Made from wood or fiberglass. The length between 9 to 24 meter. Inboard engine (mostly 200 horsepower). The average of fishing crew 5. Trip duration from1 to 10 days. Landing 17 % of Oman total production. The number of dhows, traditional sailing vessels that are often larger and may be used for longer fishing trips, is 688.



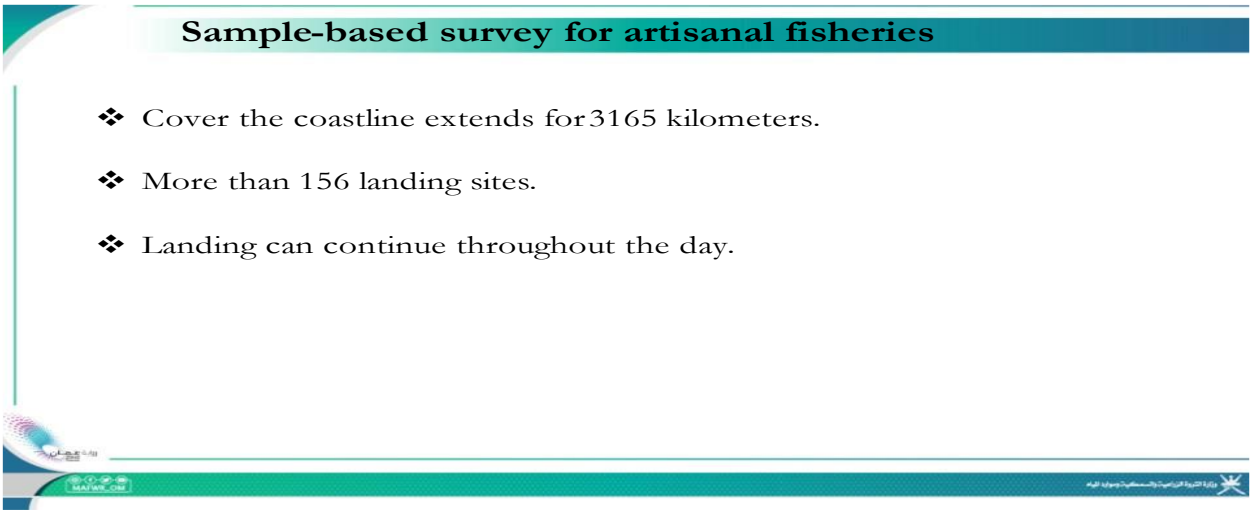
Industrial & coastal fishing :

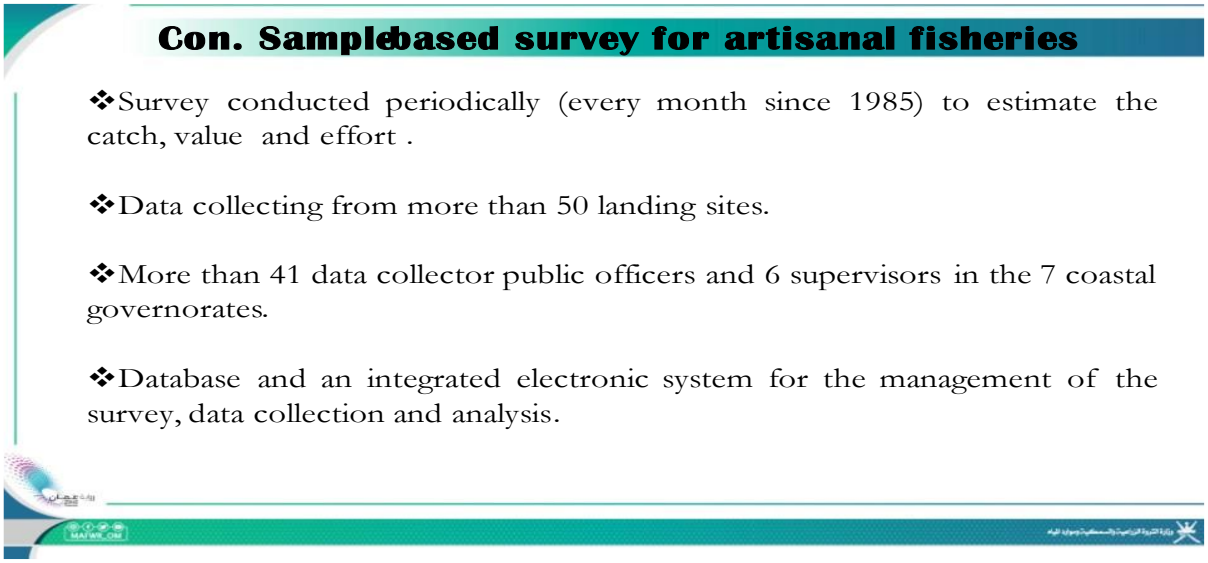
Coastal Fishery: This sector has 303 vessels involved in fishing activities along the coast. There are 550 fishermen working in the coastal fishery.

Longline Vessels and purse seiners: In this sector, there are 3 vessels equipped for longline fishing, which is a technique that uses a long line, or mainline, with baited hooks attached at intervals. New pelagics and purse seiners, corresponding to addition of vessels capable of fishing pelagic (open sea) species and those that use purse seines, a method involving nets to encircle schools of fish. The number of fishermen working on longline vessels has increased from 90 to 250. Targeting pelagic and tuna species. 100 % tracked record. The average of fishing crew 20 40. Landing 3 % of Oman total production But increasing since July 2022.

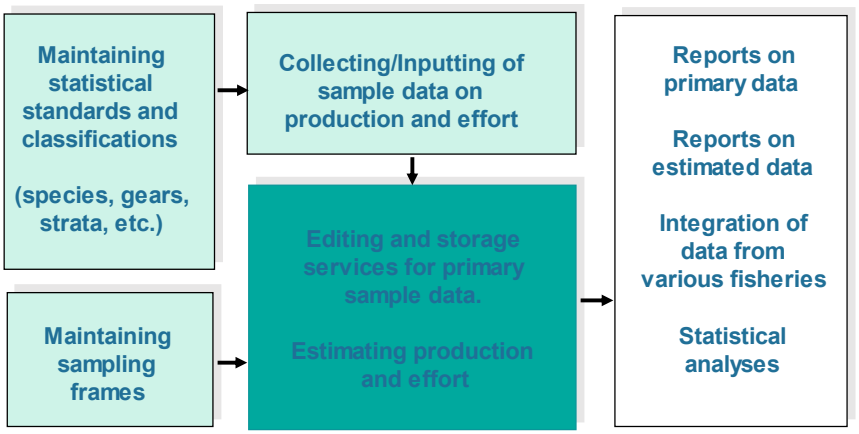
5. Fishery data collection and statistics in Oman

The Statistics Department at the General Directorate of Planning in the Ministry of Agriculture, Fisheries and Water Resources is responsible for carrying out all statistical activities related to the fishing and aquaculture. It also collaborates with the General Directorate of Customs in the Royal Oman Police to collect and analyze data on the foreign trade of fish products. Furthermore, it provides comprehensive statistical reports on fishing and aquaculture activities.





Typical functions of the sample-based fisheries statistical system for artisanal fisheries



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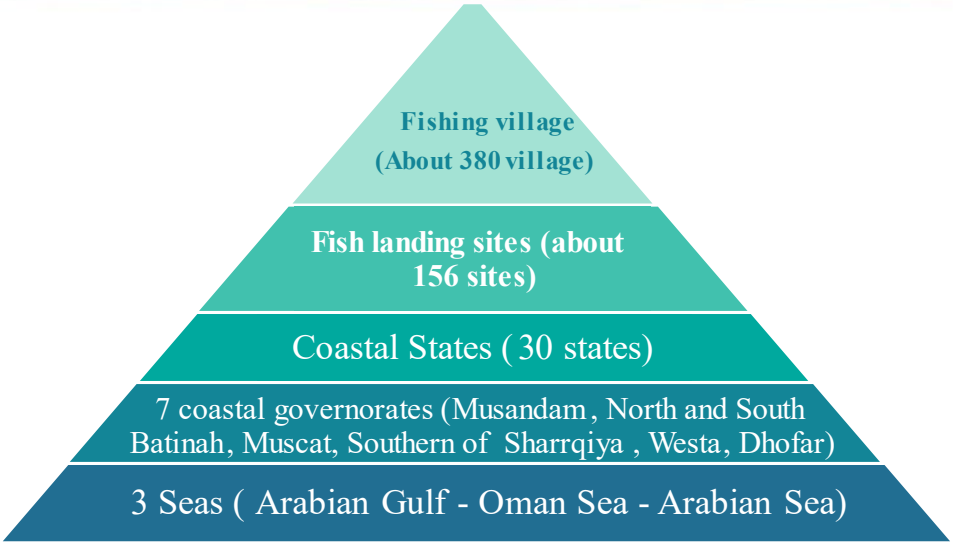
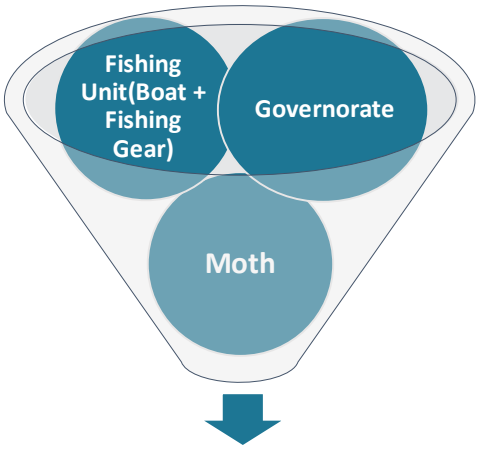
Typical functions of the sample-based fisheries statistical system for artisanal fisheries



Survey Unit



Generic process for estimating catch:

					x	Temporal extrapolation factors
Estimated catch	=	CPUE	x	Prob. Boat active		
					x	Spatial extrapolation factors

CPUE stands for: Catch Per Unit Effort

Generic process for estimating catch

CPUE → **Landings survey:**

Catch details are sampled, together with prices and average fish size by species

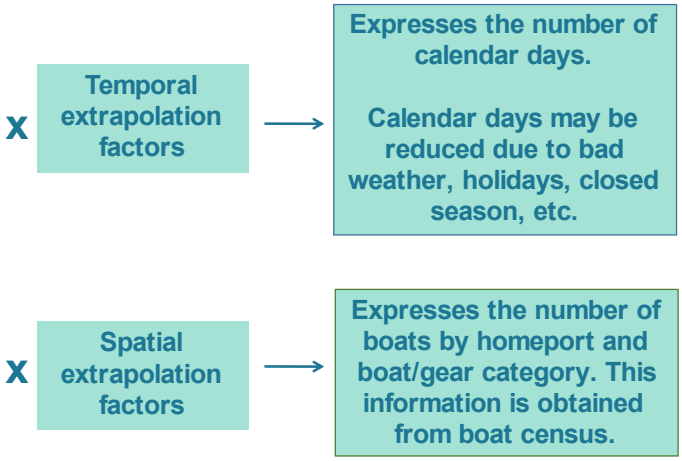
Generic process for estimating catch

Prob. Boat active → **Effort survey:**

There are several ways for determining the boat activity level.

There can exist different data schemes for groups of boat/gear categories due to operational constraints.

Generic process for estimating catch



Data Quality Control:

- Spatial Accuracy (Number of samples required)
- Temporal Accuracy (Number of sample days during the month)
- Sampling Uniformity Index (SUI)
- Coefficient of Variation (CV).

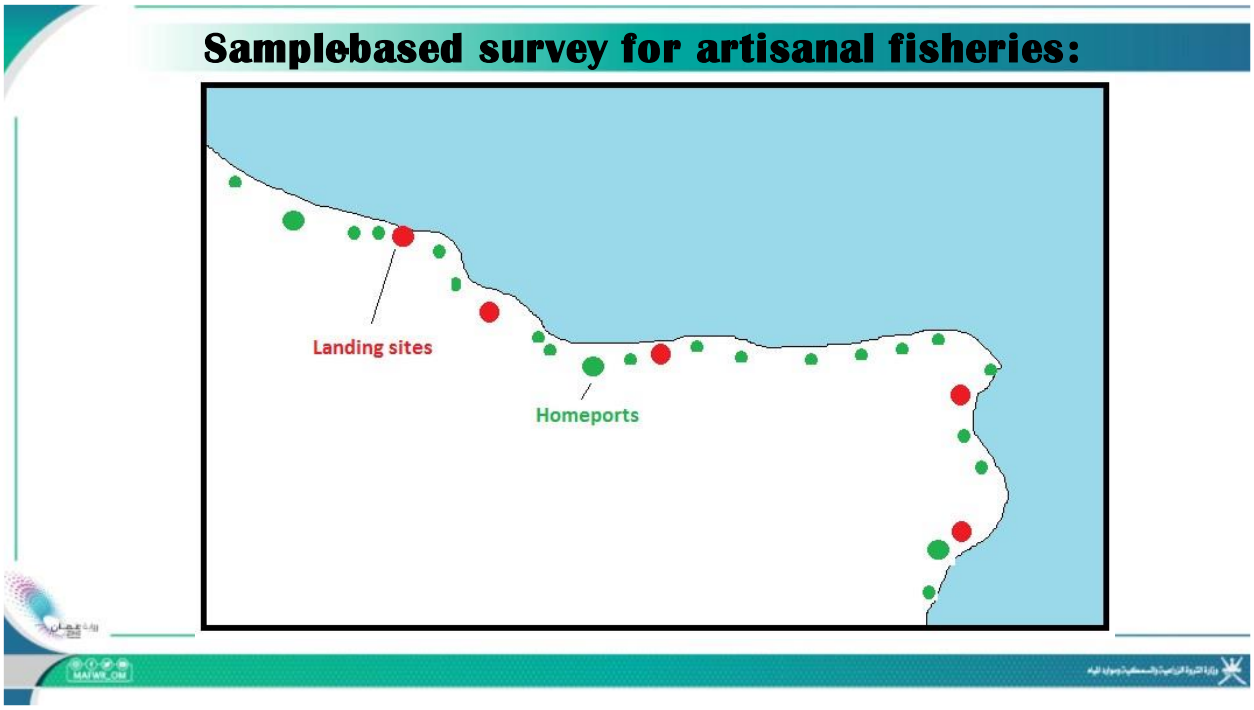
6. Re-Evaluation of the artisanal fishing system on data collection and statistics

Re-evaluation of the fisheries statistical programme of Oman focused on data collection aspects and was carried out in two stages.

- **The first stage** involved examination of the data schemes relating to landings, fishing effort and vessel information (vessel census). During this phase the previous data collection schemes were analyzed in detail and with regards to their methodological and operational characteristics. This analysis revealed a number of operational deficiencies which have an impact on the reliability of the results obtained by the previous program and which ought to be resolved by means of more effective data collection schemes.

- **The second stage** examined alternative solutions to the problems outlined above and came out with two data collection schemes that have proved to be both doable and accurate. A pilot study was planned for and subsequently conducted in selected areas representing the governorates of Dhofar, South and North Al Batinah and South Sharqiyah.

The pilot study involved design of new data collection templates, consultations with data collectors and supervisors, drafting of operational guidelines, **field operations that were carried out during July-September 2019** and analysis of the results obtained. Comparisons of the pilot survey results with those obtained by the previous system **revealed that previous data collection scheme for measuring fishing effort tends to systematically under-estimate the level of fishing activity; this shortcoming causes total production to also be systematically under-estimated. It was thus felt that remedying the problem of fishing effort should become the first corrective action to be applied to the system.**



6.1 Analysis of the previous and improved data collection schemes

The methodological and operational basis of the previous statistical monitoring system for traditional fisheries consists of a boat census conducted every 10 years (last census was in 2014) and of a sampling programme that collects data on catch, effort, prices and average fish size.

The main objective of the system was to estimate total catch and fishing effort by first estimating

- **the variables CPUE and**
- **the Probability of Boat Activity (PBA) and thence extrapolating their combined value using spatial and temporal extrapolating factors.**

The data collection scheme for the CPUE and PBA are integrated into **a single survey** by means of which all boats landing on a given day at a landing site are enumerated to provide the total daily effort for that site.

This figure is then extrapolated in space and time. This approach has proved quite efficient and sustainable as far as the CPUE and landings by species are concerned.

Catch details by species as well as prices and average fish size are estimated using ample sample sizes and frequent site visits, thus resulting in quite good accuracy levels.

With regards to fishing effort, however, the following weaknesses were identified:

(a) For operational reasons the previous data collection schemes for the CPUE and Probability of Boat Activity (PBA) are integrated into a single survey. This means that all boats landing on a given day at a landing site are enumerated to provide the total daily effort for that site. This figure is then extrapolated in space and time. The disadvantage of this approach is that

(1) in several instances the **total number of landings cannot be determined accurately,** thus **resulting in boat activity levels that were uncharacteristically low**.
(2) On the other hand, fishing effort should always be collected at home ports and not at landing sites. At previous, boats operating from their home ports are intercepted at sites that, in theory, they might not have any boats, thus making it difficult to formulate an accurate proportion of the type: (boats active) / (all boats at site).

In such situations the most obvious solution **was to separate the landings survey from the effort survey**. This, in turn, will mean that while the system will continue to sample landings at landing sites, it will also collect fishing activity data in a parallel and independent manner and using home ports rather than landings sites.

(b) The previous data collection scheme for fishing effort **is not appropriate for boats that make trips longer than one day** (i.e. dhows). The fact that dhows may be at sea several days reduces the chance that they would be marked as "active" during site visits. Typically, such fishing units need the "day-based" approach to be implemented on a monthly or weekly basis. In such a case the fishermen themselves are involved in the data collection process, as they are invited to disclose their fishing activities during a pre-determined period (i.e. past week or passed month).

(c) By far **the most serious weakness of the previous system is the frequency and scope of the boat census which is the only source of providing spatial extrapolating factors for fishing effort. Since the census was conducted every 10 years**, boat counts changed by time; extrapolation is also conditioned by the lack of detailed breakdown of boats by boat/gear types as required by the landings and effort surveys.

Fortunately, **the Fisheries Surveillance and Licensing Department has worked on developing a digital platform for licenses**, including licenses for artisanal fishing boats and vessels. They have also enacted Decisions in this regard, including **mandatory data updates to create new license numbers for the boats**. As a result, this has enriched the license databases with valuable and useful information about the number of boats, vessels, and fishing units used on each boat. These data are now being utilized in the fisheries statistical system.

6.2 Implications of introducing improved data collection schemes for fishing effort

The field operations of the Pilot Effort Study and the analysis of its results have indicated that while it should be essential, for methodological purposes, to change the operational modalities of effort surveys, such changes should unavoidably have a significant impact on both field and office procedures. The following disadvantages and advantages have so far been identified:

Disadvantages

(a) Collection of effort for small vessels at home ports directly involves fishermen who are asked to specify as to whether they have been fishing on that day. Some data collectors have had initial doubts as to whether such answers would be possible to collect regularly and accurately. However, their reaction became much more positive once it was explained that only a limited number of randomly selected fishermen (not more than ten) need be asked during a sampling day.

(b) At previous data collectors do their regular work using the previous operational modalities. On top of this work they will also have to collect data under the new effort schemes. However, it is evident that working on the new schemes does not require a prolonged data collection period to cover all landing boats. This allows for a smoother transition to the new survey for boat effort as per the improved schemes.

(c) The new data collection schemes require the preparation of new electronic templates at data collection level. These utilities should cover the entire data collection process, i.e. randomization of and selection from lists of fishermen, inputting of data and, submission of data. They also require modifications to the current ORACLE database structure as well as the development of new modules for the data management of the new information. This is what has been done in the recent period following the pilot study in 2019, where adjustments were made to align with the new landing and effort scheme.

Random samples were also drawn from the system, and the targeted fishing units were identified, along with the required sample size for each data collector based on spatial and temporal distribution.

In addition to the previous adjustments, targeted accuracy indicators were established, with a target accuracy level of 95%. These indicators serve as the basis for determining the required number of samples, aligning with the available financial resources for fisheries statistical work.

Other indicators related to data and output quality were also introduced, such as:

- Spatial Accuracy (Number of samples required)
- Temporal Accuracy (Number of sample days during the month)
- Sampling Uniformity Index (SUI)
- Coefficient of Variation (CV).

Advantages

(a) From a methodological perspective, the new effort schemes represent a significant improvement in accuracy and robustness compared to their predecessors. They have effectively eradicated any ambiguities related to site types (whether landing sites or home ports), resulting in much more dependable Probability of Boat Activity (PBA) estimates.

(b) The two effort schemes handle small and larger vessels differently; they will thus offer much more flexibility of action in operational terms.

(c) The new effort scheme allows for obtaining information over the phone. This advantage is leveraged to further reduce the data collection effort and the time spent at sites.

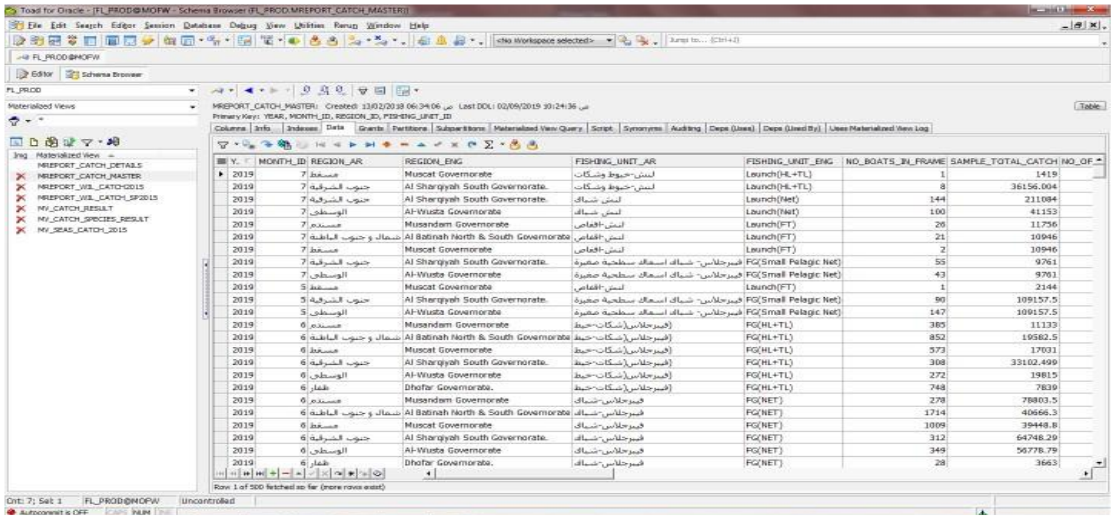
(d) The 2019 Pilot Study demonstrated that effort measurement under the previous system involves a systematic negative bias, both for small vessels as well as for the dhows. Under the new schemes such biases have significantly decreased or ceased.

(e) After some initial operational difficulties in understanding and operating with the new procedures, data collectors realize that the new schemes for fishing effort in fact involve much less work at fishing sites, since they do not have to be present during their entire working day.

(f) The modifications to the ORACLE database system also provided the opportunity to enhance the system with tighter checks of numerical data and, most importantly, with fully automated procedures for estimating catch and fishing effort.

(g) Parallel computer runs using old and new schemes and applied to the same statistical areas have clearly indicated that the new approaches provide more realistic estimates for fishing effort.

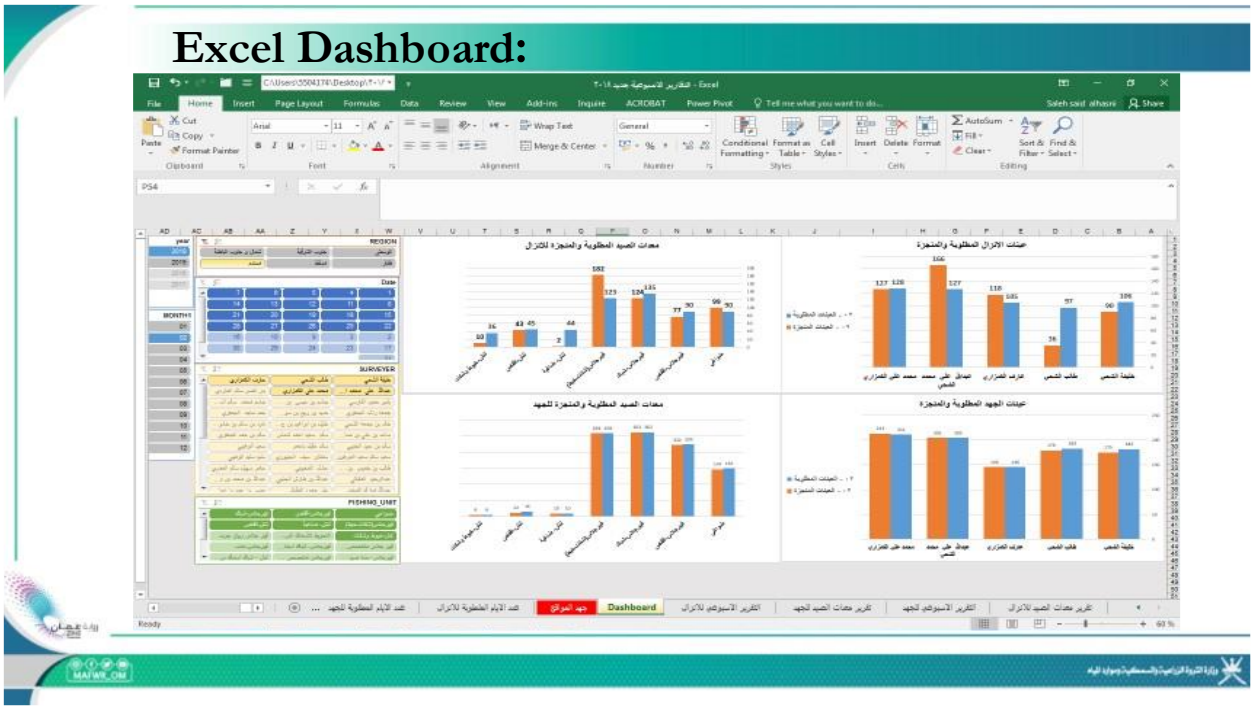
Oracle Database




وزارة الزراعة والثروة السمكية
منظومة إحصاء الصيد الحرفي


منظومة احصاء الصيد الحرفي
قائمة المهام
مهام إنزال
مهام جهد
إضافة مهمة انزال
إضافة مهمة جهد
تقرير الإنجاز
حالة التعطل
خروج
سحب الصور
تناقل بيانات
اعدادات
الثلاثاء 04/02/2014
مهام الانزال 0
مهام الجهد 4
الاربعاء 05/02/2014
مهام الانزال 3
مهام الجهد 0
الخميس 06/02/2014
مهام الانزال 1
مهام الجهد 4
الاحد 09/02/2014
مهام الانزال 3
مهام الجهد 0
الاثنين 10/02/2014


معاينة إنزال قارب
مسيد القارب رقم :
1
وحدة المسيد :
فيرجلاس - أفقاس
إسم النوع :
هامور
الإسم المحلي :
مسندم: سمان عربي . عنكب . خلق.
الباطنة: سمان. مسقط: سمان عربي،
الشرقية: سمان. الوسطى: سمان. ظفار:
قلموق أسود .خلخول اسود
الإسم الإنجليزي :
Brownspotted grouper
الإسم العلمي :
Epinephelus chlorostigma
أقصى طول مسجل:
75 TL
أكبر وزن مسجل:
7
الطول الشائع:
50
السابق
إختيار
التالي
حفظ
جديد



6.3 Summary of Key Measures Impacting the Enhancement of Artisanal Fishing Statistics System

The improvements in data collection schemes for Oman's fisheries sector can be described in detail through the following developments:

Improved Data Collection Schemes:

The introduction of enhanced data collection methods for fishing efforts has substantially improved the precision and trustworthiness of the system. These advanced schemes have been crucial in resolving uncertainties concerning the types of fishing sites, which in turn has yielded more reliable Probability of Boat Activity (PBA) estimates. By reducing the ambiguities in the data collection process, fisheries managers are now equipped with better tools to estimate fishing effort and understand the impact on fish stocks.

Separation of Landings and Effort Surveys:

In efforts to rectify operational inefficiencies, it has been suggested to segregate landings and effort surveys. This structural change in data gathering allows for a more refined collection of fishing activity

data directly from the home ports rather than the landing sites. This shift is expected to result in more accurate assessments of fishing effort, as data will reflect the actual output of fishing activities from their point of origin, thus ensuring that reported figures are a closer representation of reality.

Adoption of New Electronic Templates:

The fisheries sector has seen the adoption of innovative electronic templates that have modernized the data collection process from the ground up. These templates facilitate the random selection of fishermen for surveys and standardize the input and submission of data. This digitization minimizes the likelihood of human error and enhances the efficiency of the data collection process, making it quicker and more reliable.

Enhancements to ORACLE Database:

Upgrades to the ORACLE database have introduced stringent checks for numerical data, which help prevent inaccuracies and inconsistencies. These modifications have also enabled the full automation of procedures used to estimate catch sizes and fishing efforts. The improvements to the database infrastructure not only enhance data integrity but also allow for more sophisticated analysis and reporting capabilities.

Increased Flexibility for Small and Large Vessels:

Recognizing the diverse nature of Oman's fishing fleet, the newly introduced effort schemes distinguish between small and larger vessels. This differentiation allows for tailored data collection strategies that accommodate the operational differences between vessel sizes. By offering more flexibility, the new schemes ensure that data collection is adapted to the unique needs of each vessel class, thus improving the granularity and applicability of the data gathered.

Phone/Digital-Based Data Collection:

The latest effort schemes have integrated the use of phone and digital platforms for data collection, which allows for the gathering of information remotely. This modern approach minimizes the need for data collectors to be physically present at fishing sites, streamlining the entire process. It's a significant shift towards leveraging technology to simplify data collection efforts.

Improved Accuracy and Bias Reduction:

The newly implemented data collection schemes have substantially diminished, if not completely eradicated, the systematic biases previously encountered in the measurement of fishing effort, particularly for smaller vessels and dhows. By addressing these biases, the data obtained is now much more reflective of the actual fishing efforts, enhancing the overall accuracy of the statistics.

Efficiency Gains for Data Collectors:

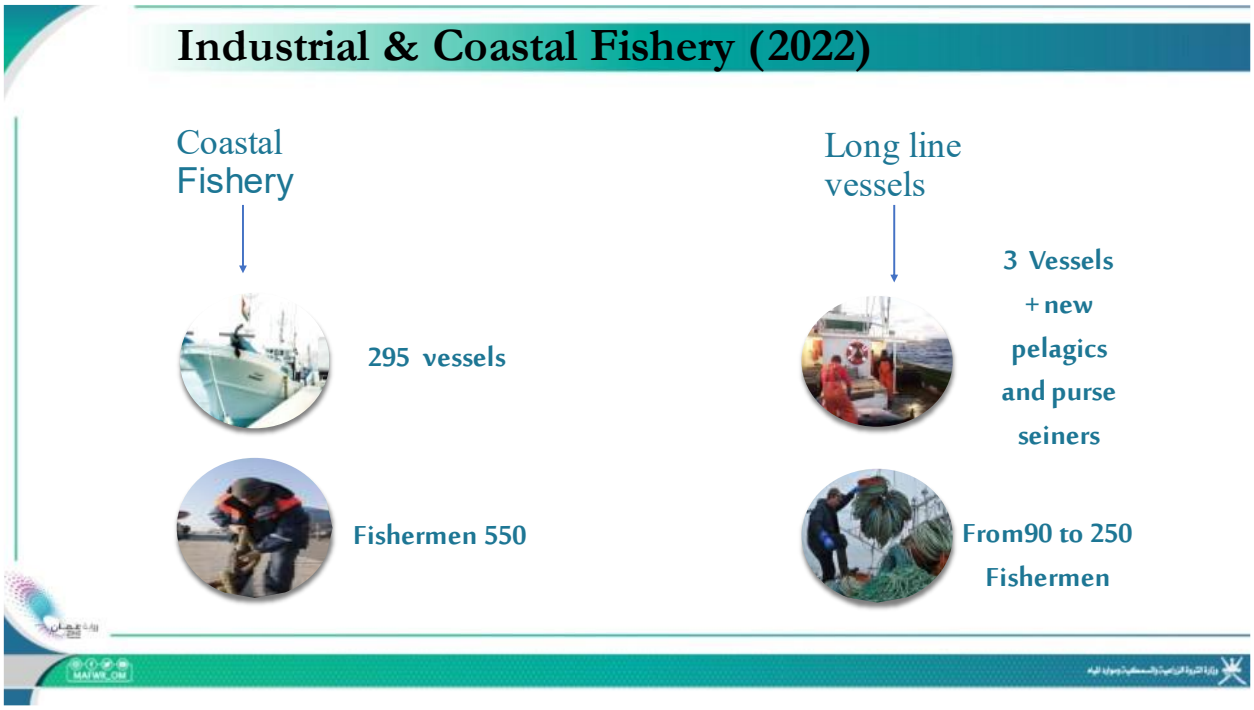
The efficiency of data collectors has seen notable improvement with the new schemes. Training programs have equipped them with the skills necessary to execute their duties with increased proficiency. The modernized system means they no longer need to spend their entire working day on-site at fishing locations, which has led to reductions in both time and labor involved in the data collection process.

Use of Parallel Computer Runs:

In assessing the effectiveness of the new data collection approaches, parallel computer runs have been utilized to compare the old and new schemes. These comparative analyses have consistently shown that the new methods offer more realistic and reliable estimates of fishing effort.

Collectively, these measures have significantly improved the accuracy and efficiency of Oman's artisanal fishing statistics system. They contribute to the enhancement of data quality and reliability, facilitating better-informed decisions regarding fishing effort, catch sizes, and other crucial aspects of the industry. With these advancements, Oman's fisheries management is better positioned to gather more reliable data and hence support sustainable practices and long-term planning.

Data collection and statistics in the industrial and coastal fisheries



Industrial & Coastal Fishery:

- ❖The fishing logbook is the primary method of data collection.
- ❖It captures data on fishing activity by individual vessels by trip, and for each day of activity within a trip.
- ❖This includes details of the catch, by species, in terms of the presentation and quantity of fish retained on board.

استمارة تسجيل المصيد للسفن

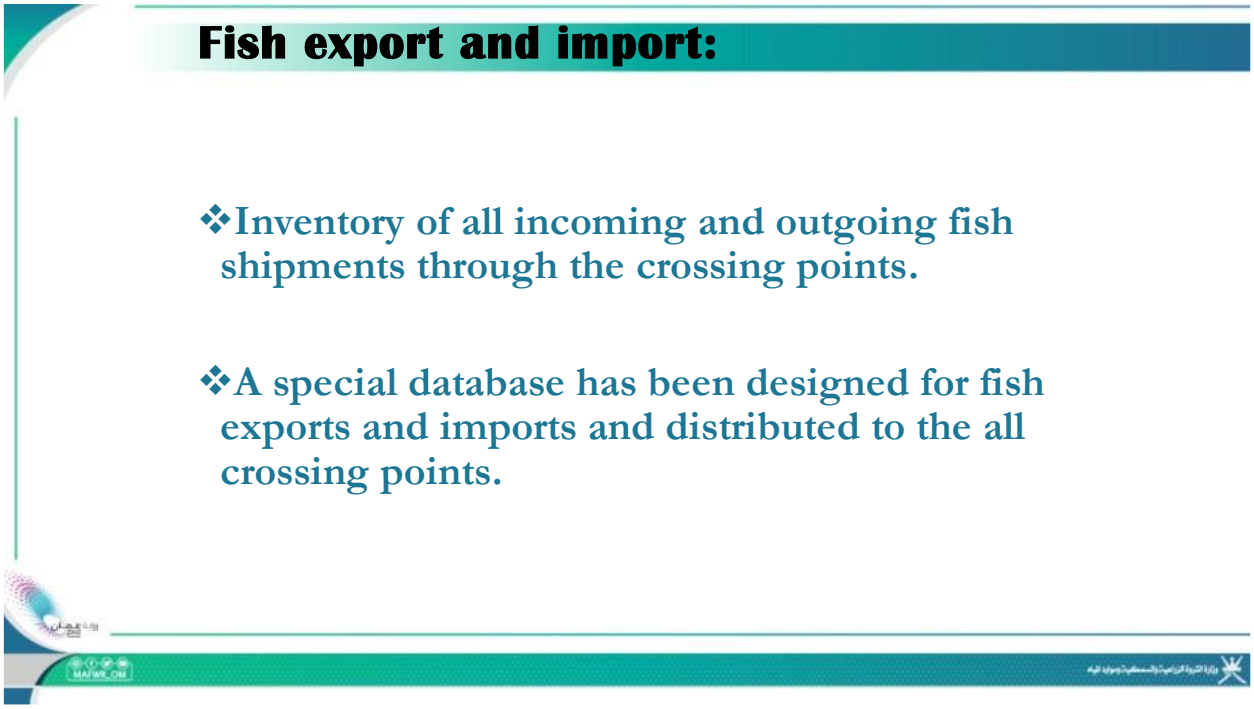
Fishing Vessels Catch Report

Vessel Name: ___ مالك السفينة: Owner:Vessel ___ اسم السفينة:
Captin Number: ___ قبطان السفينة: ___ رقم الترخيص:
Fishing: Artisanal - Coastal - Industerial طريقة الصيد: Name:Lisence ___ رحلة رقم:
Departure ___ ميناء الإبحار: type:Trip Number: ___ تاريخ الإبحار:
___ ميناء العودة: port:Departure ___ تاريخ العودة:
Date: Arrivel port:Arrivel Date: ___ نوع المعدة
Used Gear

Catch in Number & Weight by Species. المصيد حسب النوع وعدد الحبات والوزن

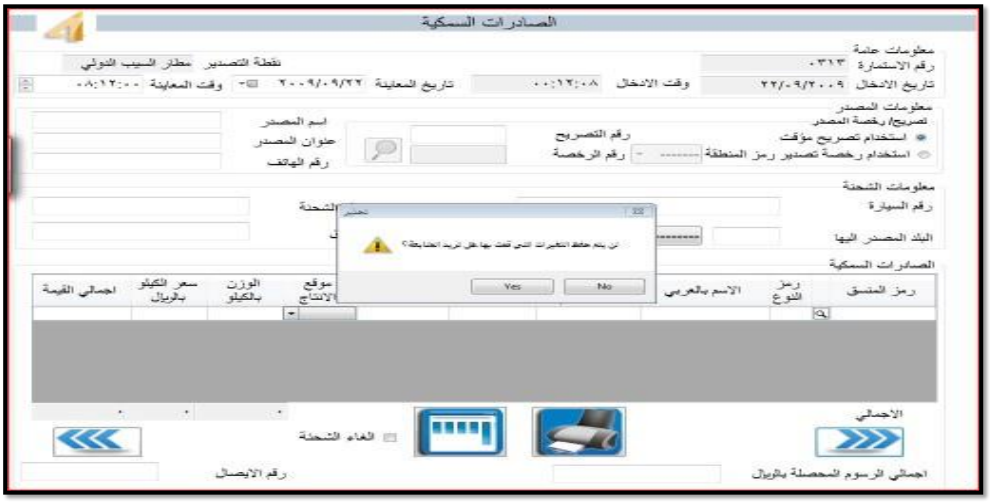
Code	Species	Date التاريخ lat: Long:		Date التاريخ lat: Long:		Date التاريخ lat: Long:		النوع
		الوزن(كيلو) Weight (Kg)	عدد الحبات Unit No.	الوزن(كيلو) Weight (Kg)	عدد الحبات Unit No.	الوزن(كيلو) Weight (Kg)	عدد الحبات Unit No.	
ARI	Catfish							[illegible]
ATRA	Geelbeck croaker							[illegible]
AUXT	Frigate tuna							[illegible]
CAR	Jack							[illegible]
CHA	Milkfish							[illegible]
CRAB	Marine crabs nei							سرطان البحر
CUT	Cuttlefish							حبار
DEM	Demtrsal							أسماك قاعية
ELAB	Rainbow runner							[illegible]
HAE	Sweetlips							[illegible]
LET	Emperors							الشعري
NEM	Treadfin bream							[illegible]
OLUT	Snappers							حمراء
OCTO	Octopus							أخطبوط - [illegible]
OHAE	Sweetlips							الجرور
OSPA	Seabreams							كوفر
OTH	Others							أخرى
POM	Bluefish							[illegible]
PSE	Indian spiny turbot							كبش البحر

Data collection related to fish export and import



Fish export & import database:

Fish export & import database:



7. Retrospective analysis

In light with the above and the several exchanges of views taken place during the last years in relation to the improvement of the quality and accuracy of the data collection and statistics, Oman is considering the possibility to undertake a retrospective analysis catches of the period 2010-2019.

8. Conclusions

In recent years, Oman has embarked on a comprehensive overhaul of its data collection procedures for the fishing industry. This initiative was catalyzed by workshops and training facilitated by experts from the Food and Agriculture Organization (FAO) and the Indian Ocean Tuna Commission (IOTC), most notably the 2019 workshop on IOTC Data Reporting Requirements. The results of these efforts have led to significant improvements in the nation's fisheries statistics system, as detailed below:

Enhancement of Data Collection Schemes: The revision of data collection methodologies, particularly those related to fishing effort, has dramatically improved both the accuracy and reliability of the data collected. These new schemes have effectively resolved previous uncertainties regarding the types of fishing sites, which has, in turn, led to more reliable Probability of Boat Activity (PBA) estimates. The precision of these estimates is crucial for the appropriate management and conservation of fish stocks.

Implementation of Additional Measures: Oman has adopted several key measures aimed at refining its data collection processes. These include:

- The separation of landings and effort surveys, which has yielded more precise data on fishing activities.
- The introduction of new electronic templates that have streamlined the data input and reporting process.
- Database enhancements, specifically to the ORACLE system, have introduced stricter data checks and automated data estimation processes.
- Modifications to accommodate the operational differences between small and large vessels, providing greater flexibility and tailored data collection approaches.
- The transition to phone/digital-based data collection methods, which has reduced the need for on-site data collection and enhanced overall efficiency.
- The reduction or elimination of systematic biases in data collection, particularly concerning small vessels and dhows, leading to more accurate data.
- Training of data collectors on the new systems has made their work at fishing sites more efficient, as they no longer need to be present throughout their entire working day.

- The employment of parallel computer runs to validate the improvements in the new data collection schemes, confirming that these methods yield more realistic estimates of fishing effort.
- Prospective Analysis of Tuna Catches: Looking forward, Oman has outlined plans to conduct a retrospective analysis of tuna catches spanning the decade from 2010 to 2019, with external support. This analysis is expected to provide valuable insights into historical catch trends, potentially informing future management decisions to ensure the sustainability of tuna stocks.

The confluence of these measures indicates a proactive and methodical approach by Oman to enhance the quality and reliability of its fisheries data. These improvements are a testament to Oman's commitment to sustainable fishing practices and responsible fisheries management, which are critical to the health of marine ecosystems and the livelihoods of communities dependent on fishing.

Muscat, November 2023

ANNEXURE 1

The official response from Oman

Regarding the FAO inquiries, **we made inclusive review of our statistical system to solve some issues related to landing coverage especially on sampling of fishing units (type catch and effort) at any time (24/7) and at any landing places that can explain Oman recent increase in total catches.**

In addition, we started from 2017 to collect auxiliary data to cover purchases of fish factories and companies from local fishers. The step was important and parallel with results from some initiatives raised from fisheries wealth (one of the main sectors contributes to diversifying sources of income) laboratories conducted in 2017 especially those allowing few licenses for fish meal and oil factories in Arabian sea.

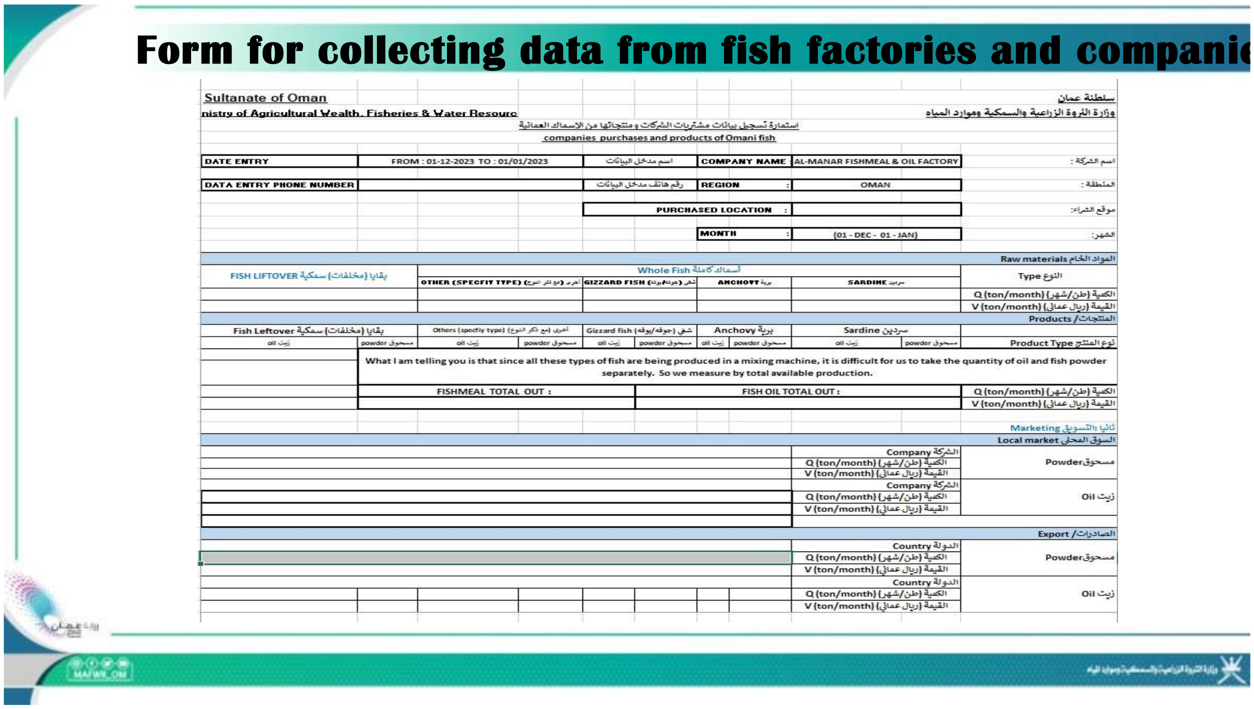
Where fishing for fish used in fish meal and oil industry, including types of sardine, depends on fishing units that are difficult to track and take their data, especially with the extension of the coasts of the Arabian Sea and none existing of landing time regulation.

Besides that, there is increase in the capture production quantities of small pelagic fish in Arabian Sea, sardines at top, and there are many reasons caused the increasing of the inquired species in terms of their landings:

1. First, Existence of good markets nearby, especially after 2016 where fish meal and oil factories have been established.
2. Secondly, the fishermen community in Al Wusta Governorate had an old tradition for not targeting this species, however, recently with availability of markets they started catching them.
3. The increase in the yellowfin production quantities results from an increase in CPUE naturally, the close explanations of this may be due to nature of these migratory species and the targeting of fishing fleets during their migration.

The total number of oil and fishmeal production factories

regions	No factories
Sharqiya	2
Al Wusta	4
Dhofar	2
Batinah	1
Total	9



Form for collecting data from fish factories and companie

Sultanate of Oman	سلطنة عمان
nistry of Agricultural Wealth, Fisheries & Water Resourc	وزارة الثروة الزراعية والسمكية وموارد المياه

استمارة تسجيل بيانات مشتريات الشركات و منتجاتها من الاسماك العمانية

companies purchases and products of Omani fish

DATE ENTRY	FROM : 01-12-2023 TO : 01/01/2023	اسم مدخل البيانات	COMPANY NAME :	AL-MANAR FISHMEAL & OIL FACTORY	اسم الشركة :
DATA ENTRY PHONE NUMBER		رقم هاتف مدخل البيانات	REGION :	OMAN	المنطقة :
			PURCHASED LOCATION :		موقع الشراء:
			MONTH :	(01 - DEC - 01 - JAN)	الشهر:

Raw materials المواد الخام

FISH LIFTOVER بقايا (مخلفات) سمكية	Whole Fish أسماك كاملة				
	OTHER (SPECFIT TYPE) أخرى (مع ذكر النوع)	GIZZARD FISH شغي (جوفه/بوفه)	ANCHOVY برية	SARDINE سردين	Type النوع
					Q (ton/month) الكمية (طن/شهر)
					V (ton/month) القيمة (ريال عماني)

Products /المنتجات

Fish Leftover بقايا (مخلفات) سمكية		Others (specfiy type) أخرى (مع ذكر النوع)		Gizzard fish شقي (جوفه/بوفه)		Anchovy برية		Sardine سردين		
oil زيت	powder مسحوق	oil زيت	powder مسحوق	oil زيت	powder مسحوق	oil زيت	powder مسحوق	oil زيت	powder مسحوق	Product Type نوع المنتج

What I am telling you is that since all these types of fish are being produced in a mixing machine, it is difficult for us to take the quantity of oil and fish powder separately. So we measure by total available production.

FISHMEAL TOTAL OUT :	FISH OIL TOTAL OUT :	Q (ton/month) الكمية (طن/شهر)
		V (ton/month) القيمة (ريال عماني)

Marketing ثانيا :التسويق

Local market السوق المحلى

	Company الشركة	Powder مسحوق
	Q (ton/month) الكمية (طن/شهر)	
	V (ton/month) القيمة (ريال عماني)	
	Company الشركة	Oil زيت
	Q (ton/month) الكمية (طن/شهر)	
	V (ton/month) القيمة (ريال عماني)	

Export /الصادرات

	Country الدولة	Powder مسحوق
	Q (ton/month) الكمية (طن/شهر)	
	V (ton/month) القيمة (ريال عماني)	
	Country الدولة	Oil زيت
	Q (ton/month) الكمية (طن/شهر)	
	V (ton/month) القيمة (ريال عماني)	