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PROPOSED OPTIONS FOR DATA REPORTING OF DORADO

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This document was produced in response to Resolution C-23-09 "Research for the Management of Dolphinfish (Dorado) (*Coryphaena hippurus*)."

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EXECUTIVE SUMMARY

At the IATTC's 101st meeting in 2023, Resolution C-23-09 "Research for the Management of Dolphinfish (Dorado) (*Coryphaena hippurus*)" was adopted. The Resolution considers, among other things, Article VII, paragraph 1(f) of the Antigua Convention mandating the Commission to "*adopt, as necessary, conservation and management measures and recommendations for species belonging to the same ecosystem and that are affected by fishing for, or dependent on or associated with, the fish stocks covered by this Convention, with a view to maintaining or restoring populations of such species above levels at which their reproduction may become seriously threatened*". It recognizes that, "*dolphinfish is a species targeted by artisanal and industrial longline fisheries by several CPCs amounting to 98% of the catches in the EPO; and incidentally caught by vessels using purse-seine gear operating in the Convention Area estimated at 2% of total catches of this species; and is within the fish stocks of interest to the Commission*". Additionally, IATTC's staff activities and research plan (IATTC-100-02b) identified the need for research to better assess stock status of dorado in the EPO. This document addresses paragraph 2a) of the Resolution, which tasks the IATTC scientific staff to "*develop a proposal to standardize the format for data reporting and present it at the meeting of the Scientific Advisory Committee in 2024*". Herein data requirements are included under the 'umbrella' Resolution C-03-05 on data reporting, adapted from the staff's recommendations to update this resolution (see SAC-12-09, WSDAT-01-01, SAC-14 INF-Q) to better align with requirements in the newly adopted dorado resolution. The proposal presents three options for data reporting to be developed by IATTC staff, all of which are designed to ease the workload and reporting

responsibility of CPCs:

(1) standards, guidelines and templates for mandatory data fields, to allow CPCs to submit data in their preferred format so long as they follow these templates—a potentially desirable option for CPCs with data collection programs in place;

(2) fixed digital templates in Excel for CPCs to fill, and for IATTC staff to subsequently import data using a standardized script—a potentially desirable option for countries embarking on a new data collection program; or

(3) dependent upon the context (e.g., when financial support is available) and when a higher frequency of data submission is needed, customized online forms or electronic-reporting apps could be developed and made available on electronic devices to expedite data reporting and reduce reporting responsibility on CPCs.

1. INTRODUCTION

Dorado (*Coryphaena hippurus*) is one of the most important species (by weight) caught in the small-scale coastal ('artisanal') fisheries of the coastal States of the eastern Pacific Ocean (EPO). For more than a decade the species has been considered by Members and Cooperating non-Members (CPCs) as being important to monitor in the region. In recent years, coastal Member States have requested collaborative research and guidance from the IATTC staff on regional dorado research, with a view to inform stock assessment. Collaborative research between IATTC's scientific staff and some coastal CPCs commenced in 2012, with initial attempts to assess the stock status, population trends and the potential impacts of fishing. As part of this process, three regional technical meetings on dorado were held in 2014, 2015 and 2016 to identify, collate, discuss and analyze available data necessary for conducting research on population and fishery dynamics. A series of documents resulting from these collaborations were presented at the Scientific Advisory Committee (SAC) meetings of the IATTC. Document SAC-05-11b described preliminary results from the collaborative work and a potential research plan that included developing methods to define stock structure, reviewing literature, selecting candidate indicators and analytical methods for population monitoring and conducting management strategy evaluation (MSE). Following identification of high-quality artisanal longline data (e.g., length composition data, catches, CPUE), primarily from Ecuador and Peru, along with identification of population and fishery processes following the regional workshops, an exploratory stock assessment of dorado in the southeastern Pacific Ocean (SEPO) was conducted (SAC-07-06a(i)), where sufficient data were available. In contrast, dorado fisheries in the northern region (i.e., north of the equator) did not have available comparable data to conduct integrated stock assessments and improvements in data collection programs were recommended. Following the initial SEPO stock assessment, an exploratory MSE of dorado was conducted (SAC-07-06a(ii)). In 2019, alternative potential reference points and harvest control rules for dorado in the EPO were presented in SAC-10-11. A strategic regional scientific plan for dorado was described in SAC-12 INF-D in 2021 and included three projects in accordance with IATTC's inaugural Strategic Science Plan (SSP): Project C.4.c "Improving data collection for mahi-mahi fisheries in the EPO", Project F.3.a "Conducting a mahi-mahi tagging study to improve the stock structure knowledge in the EPO" and Project H.7.c "Conduct stock assessment of mahi-mahi". A stock assessment of dorado in the SEPO was also included in SAC-13 INF-O (2022) along with a genomic characterization of dorado in the EPO in SAC-13 INF-P (2022), both undertaken by researchers of CPCs. In 2023, a SAC recommendation to the Commission (SAC-14-16) was "*that the Commission consider assessing and managing the mahi-mahi stock*". This compilation of work led to the Commission adopting Resolution C-23-09 to mandate and improve data collection and reporting for fleets whose catches of dorado comprise greater than 5% of their total annual catch of all species. The data to be collected and submitted includes biological, catch and interaction data, as well as fishing effort data for these fleets. Whilst the Resolution allows for artisanal and recreational fleet data to be reported as total annual catches without data on fishing effort, the ability for IATTC staff

to assess dorado and develop recommendations for appropriate conservation and management measures critically depends on the provision of operational-level data (e.g., set date and position, catch, effort, as well as size and sex of the fish when available) from these small-scale or artisanal fleets that contribute most to the total catch of dorado in the region. Thus, it is important that CPCs undertake efforts to collect and report detailed data from small-scale and artisanal fisheries catching dorado to support an updated assessment.

Resolution C-23-09 calls for the IATTC scientific staff to, "*develop a proposal to standardize the format for data reporting and present it at the meeting of the Scientific Advisory Committee in 2024*". Mechanisms are already in place for the provision of data under the umbrella of Resolution C-03-05 and its corresponding technical specifications. These specifications underwent a formatting change in 2024 aimed at improving clarity on data requirements by formally linking the Resolution with its technical specifications—and were posted directly to IATTC's website under the "Resources" tab, titled "Reports and provision of data". Historically, these technical aspects were drafted in an annual memorandum sent by the Director to CPCs, prior to the preparations for the annual SAC meetings.

In 2021, the IATTC staff reviewed Resolution C-03-05 (adopted in 2003) in SAC-12-09 and noted the outdated nature of this Resolution with respect to mandates in the Antigua Convention (entering into force in 2010) that include non-target, dependent and associated species and the effects of the fishery on the ecosystem. Furthermore, the staff identified data gaps and high variability in reporting related to Task I and II data—defined in the data provision specifications—particularly in reference to inconsistent and/or lack of reporting of the taxa other than tuna and tuna-like species listed in Table 2 of the specifications, which includes dorado. Housing these specifications on the IATTC website facilitates an improvement in communication and highlights the "Required Data" outlined in paragraph 2 of these specifications.

In response to SAC-12-09 and the need to update C-03-05 to better align with the Antigua Convention and it's expansion of mandates, the staff included a recommendation on general data provisions (see section B paragraph 3 in SAC-12-16). This recommendations states, "*Through a series of workshops planned and facilitated by the staff, revise resolution C-03-05 in consultation with CPCs, taking into consideration the elements presented in SAC-12-09. These workshops will be organized by main fishery with the purpose of discussing improvements in data collection, any required additional resources and capacity building activities*". This recommendation was adopted by the SAC in 2021 and included in the SAC's recommendations to the Commission (SAC-12-RPT).

The 1st workshop, focused on the industrial longline fishery, was held virtually in January 2023 and was attended by nearly 100 participants. A series of staff recommendations were revised based on participant feedback and consultations with individual CPCs and presented at the 14th meeting of the SAC in 2023 (SAC-14 INF-Q). These recommendations were included in SAC-14-14 and were endorsed by the SAC (SAC-14-16, paragraph 1d), as well as a recommendation that the Commission review and update Resolution C-03-05 on "Data Provision", taking into consideration document SAC-14 INF-Q (SAC-14-16, paragraph 7.1 Resolution C-03-05). The importance of updating this resolution was reiterated in the staff's recommendations to the 15th meeting of the SAC in 2024 (SAC-15-13). The recommendation encouraged CPCs to draft an updated version of C-03-05, with help from IATTC's scientific staff as needed, with the intent to improve the staff's ability to more adequately demonstrate the fulfilment of the IATTC's obligations under the Antigua Convention and the SSP.

While Resolution C-03-05 provides a baseline for describing data reporting requirements, Resolution C-23-09 offers an additional opportunity to expand upon the previous work related to recommendations on updating C-03-05. Herein these experiences are drawn upon to propose data fields and options for data reporting mechanisms to align, to the furthest extent possible, with recommendations in SAC-14 INF-Q related to the industrial longline fishery, which also catches dorado, while simultaneously aiming to improve IATTC's communication on data provision requirements. It is important to note that although

dorado are primarily targeted by artisanal longline fisheries in the region, a data improvement workshop for these fisheries has been planned but not yet conducted. Other projects in the region, such as ABNJ-1, conducted in Central America for artisanal fisheries, now expanded to Ecuador, Mexico and Peru under ABNJ-2, could be leveraged, as these projects offer specific tools designed to improve data collection for these fisheries.

1.1. Objectives

The objectives of this document are to address paragraph 2a) of Resolution C-23-09 on dorado by providing a proposal for standardizing the data reporting format, while building upon previous work described in SAC-12-09, WSDAT-01-01, and SAC-14 INF-Q. Improving mechanisms for data reporting aims to provide scientists with the information necessary to accomplish research goals in the SSP and resulting recommendations on conservation and management measures for species covered by the Convention.

2. DATA NEEDS

The overarching goal of Resolution C-23-09 is for CPCs to collect and submit to the IATTC, "*biological, catch and interaction data, as well as fishing effort data relating to Dolphinfish from their fishing fleets whose catch of this species constitutes more than 5% of their entire annual catch. CPCs are encouraged to collect and submit data from other fleets, where available*" (paragraph 1) for the purpose of updating the previous stock assessments for dolphinfish (paragraph 2b(i)).

Some CPCs already collect these data on a set-by-set basis (i.e., operational-level logbook data) identified as Level 1 Task II catch and effort statistics (paragraph 2.3.1 in the data specifications pursuant to C-03-05). To ensure the scientific staff have the best available data to undertake stock assessment and fulfill obligations under the Antigua Convention, the IATTC's SSP, and to comply with various resolutions, including C-23-09, a list of proposed data fields is provided in Table 1, adapted from those in Table 4 (SAC-14 INF-Q), to address data needs for the artisanal longline fisheries. Additionally, the levels of data statistics required to be submitted to the IATTC under C-03-05 and the technical specifications, are briefly described below, as these types of data should be included in any proposed formatting options, since they are used in other IATTC reports. For example, dorado catches reported by onboard observers on purse-seine vessels and minimum reported catches by the longline fishery, using the highly summarized Task I gross annual removals, are provided annually in the *Ecosystem Considerations* report (e.g., see EB-02-01) to show the magnitude of changes in catches over time. Therefore, a description of Task I data, is also included below. The reader is encouraged to review the reporting specifications for further details.

Secondarily, Resolution C-23-09 states, "*In 2024, SAC should consider and recommend the Commission as appropriate, the creation of a voluntary group to identify the information available on the Dolphinfish (Coryphaena hippurus) resource in the various fisheries of interest to the IATTC. It should also identify information gaps that must be solved to know the status of this resource, either as target or bycatch, and possibly recommend management measures*" (paragraph 3). At its core, the nature of this initiative is collaborative, and as such, the creation of a dedicated group of scientists and stakeholders will facilitate improvements in data collection and ultimately allow the staff to better fulfill its scientific research.

2.1. Operational-level logbook data, Level 1: Task II Catch and Effort Statistics

These data include gross removals and disposition (retained or discarded) for each species, and the associated fishing effort at the set level for vessels fishing for tunas in the Convention Area, as described in the specifications. Currently, operational-level logbook data are not provided to the IATTC by the industrial longline fishery. Submission of longline observer data has been improving, although the analyses presented in BYC-10 INF-D show the mandated coverage of at least 5% (Resolution C-19-08) is often not reached and the collected data are not considered to be representative of fleet activities for the target tunas, and therefore, likely unreliable for estimating total catches for bycatch species. Operational-

level data are necessary to adequately assess the stock status of dorado. As such, a list of recommended data fields at the trip and set level is provided in Table 1 (adapted from Table 4 in SAC-14 INF-Q), and proposed options for submitting these data are presented in section 3 below.

2.2. Aggregated data, Levels 2 and 3: Task II Catch and Effort Statistics

Although level 1 operational data is desirable, particularly for conducting analyses needed for stock assessments, this high-resolution data may not always be possible. In these instances, and as defined in the specifications (paragraph 2.3), catch (i.e., gross removals and disposition: retained or discarded) for each species and associated fishing-effort statistics (e.g., number of hooks) may be submitted in an aggregated form, either at 1°x1° by month (level 2) or 5°x5° by month (level 3). These aggregated data options include provision of catch data in metric tons or kilograms or nominal catch. When data are submitted, the catch units must be specified along with any conversions used to process sampled weights or measurement to round weights with a description of the methodology used for the conversions. Therefore, this information is reiterated in Table 1 and will be necessary to include in any data submission options proposed herein.

2.3. Annual, summarized data: Task I Catch and Effort Statistics

Included in the required data reporting specifications (paragraphs 2.1 and 2.2) is a summary of gross annual removals (round weight of all fish caught or killed during fishing operations) and disposition (retained or discarded) of tuna and tuna-like species, and other species, including dorado, captured in tuna and tuna-like fisheries in the Convention Area (i.e., data by species, year, gear and disposition). Like the requirements mentioned above, these catch data should be reported as round weight, in metric tons or in kilograms, and if any post-trip data processing was performed to estimate round weight, this information shall be included in the data submission. Effort statistics include the number of fishing vessels by gear, operating in the Antigua Convention Area in each calendar year.

2.4. Size composition data

Variability in reporting of catch data for fisheries without onboard observer coverage, particularly for species incidentally caught, sometimes including dorado, is apparent. The units for which data are provided also vary by CPC. Catch has been reported in either numbers or in weights, and sometimes both units. Consequently, conversion factors derived from length-weight relationships are needed to convert catch in numbers to weights and vice versa. The staff have proposed a feasibility study to update morphometric relationships and fill data gaps while opportunistically collecting biological samples for priority species in EPO tuna fisheries (SAC-14 INF-J), which if supported, could include dorado and contribute to improved data reporting under the new Resolution C-23-09. Therefore, and in addition to operational-level data, size composition data that are representative of the catches by the fisheries, at the finest possible spatial and temporal resolution, are needed and improve the quality of the science for stock assessments and management. Such catch-at-size data are described in the required data specifications (see paragraph 2.4) but currently pertain only to tuna and tuna-like fishes as defined in Table 1, which does not include dorado. However, for the purposes of satisfying the tasks outlined in the dorado Resolution C-23-09, the staff recommend making size composition data for dorado compulsory, to the extent possible (e.g., where port sampling or observer programs are available), following the specifications outlined in paragraph 2.4.

3. PROPOSAL FOR DATA REPORTING MECHANISMS

Options for data reporting mechanisms under the dolphinfish Resolution (C-23-09) remain the same as those outlined in WSDAT-01 and SAC-14 INF-Q and aim to ease the data reporting responsibility for CPCs.

The staff recommend that the following options for data reporting be developed by IATTC staff:
a. standards, guidelines and templates for mandatory data fields, to allow CPCs to submit data in their preferred format (e.g., CSV, XLS) so long as they follow these templates (e.g., Table 1)
b. fixed-field digital templates available in Excel
c. online forms and e-reporting apps in the longer term as reporting frequency increases

An example of a proposed template of data fields, adapted from those listed in SAC-14 INF-Q, is provided in Table 1 and intended to be discussed with CPCs; consequently the list of fields may evolve. Historically, data submission has been somewhat flexible in that CPCs had the option of submitting data in their preferred format, usually submitted via email as either an Excel or text file, with the goal of making data submission as easy as possible for the CPCs. Subsequently, staff have developed programmed scripts to automate, as far as possible, reading, processing, and adding data to the IATTC database tables (see WSDAT-01-01, section 6.1). This process remains as option (a) in the proposed data reporting mechanisms and may be a potentially desirable option for CPCs with data collection programs already underway.

However, the staff seek to improve data reporting in the short-to-mid-term by developing fixed-field digital templates in Excel (option (b)), using the minimum list of required data fields (e.g., the proposed list in Table 1 and similar to the Excel formats used by ICCAT and IOTC but adapted to suit IATTC data requirements). This option may be a suitable solution when CPCs initiate a new data collection program.

In the long term, staff plan to explore options for developing online forms and electronic reporting apps (option (c) above), whereby the workflow would be automated—a more complex and advanced option that may be desirable as the periodicity and volume of data reporting increases. E-reporting apps and online forms allow for timely collection of data with data quality controls being automatically applied and data being sent to the final repository in almost real time. They ensure that all data are properly and accurately collected, sent and not lost during the process (i.e., the need for paper, transportation, and third-party involvement becomes obsolete). However, this option involves that the staff collecting the data are being trained to use the electronic forms, are fully equipped with working electronic devices and have access to reliable internet connections from time to time. Initially, the cost would be higher than the other options as it involves purchase of devices, maintenance and training. However, ease of access to the data would significantly improve and the reporting processes would become streamlined in a more reliable way.

The primary goal of all of these options is to ease the reporting responsibilities on the CPCs while optimizing data quality and quantity. Regardless of which option is ultimately employed and considering that the choice of option could evolve over time, each option will include a list of minimum compulsory data fields (e.g., the proposed fields in Table 1).

TABLE 1. Recommended template of data fields (vessel and gear characteristics and operational-level logbook) for longline vessels proposed to be collected and submitted by individual CPCs to IATTC to facilitate an updated stock assessment for dorado, as tasked in Resolution C-23-09. 1a: provides metadata fields for vessel, gear characteristics; and trip-level gear information; 1b: set-level information, set-level catch information, and set-level size composition data. Table is adapted from SAC-14 INF-Q.

1a. Trip-level information

Data Type	IATTC proposed logbook fields
Vessel and gear characteristics	Flag (Vessel flag abbreviation)
	Unique Vessel Identifiers: Vessel name IMO (International Identification IMO number) (if available) IATTC Vessel number (IATTC Vessel register number assigned to all vessels)
	Length overall (Length of the vessel (meters))
	Gross tonnage (Vessel Gross Registered Tonnage) per C-18-06
	Type of vessel: artisanal ( ), mediana ( ), avanzada ( ), fibra ( ), nodriza ( ), industrial ( ), other (specify). Check appropriate box If vessel type is nodriza: provide the number of fibras
	Vessel electronics: Radar equipped (Y/N) Echo sounder (Y/N) Global Positioning System (GPS) (Y/N) Sea Surface Temperature (SST) gauge (Y/N) Search light Sonar (Y/N) Omnidirectional Sonar (Y/N) Radio/ Satellite Buoys (Y/N) Acoustic Doppler Current Meter Y/N) Expendable Bathythermograph (XBT) (Y/N) Satellite imagery, remote sensing and modelling information service (e.g., fisheries oceanography analysis) Y/N Other (specify)
	Refrigeration type: ( ) blast freezer, ( ) refrigerated sea water, ( ) ice, ( ) other ___
	Mainline material (Record the material among multiple options: Nylon monofilament, Nylon multifilament, Natural material, Polyester, Polyethylene, Glass filament, Other (Specify))
	Branch line material(s) (Record the material of the branchline. A branch line can consist of one type of material like monofilament, or it can be made up of many different materials like braided nylon wire trace and mono filament, etc.)
Trip-characteristics	Departure Date (Date and time the vessel departs from port (MM- DD -YYYY))
	Departure Port (Name of the port of departure or transshipment (if ports are close to the IATTC regional offices, the logbook information could complement port sampling in the future)
	Return Date (Date and time of vessel's return to port at the completion of its trip (DD-MM-YYYY-hh:mm))
	Arrival Port (Name of the port of arrival or transshipment (If the ports are close to the IATTC regional offices, the logbook information could complement port sampling in the future))
	Was a qualified observer onboard (Y/N)

1b. Set-by-set information

Data Type	For each set
Set-level information	Target species or target species groups
	DateTime beginning of daily fishing activities: UTC and vessel operational time (to be able to do time conversions)
	DateTime of set start (Record the date and time of the start of the set)[1]
	DateTime of set end (Record the date and time of the end of the set)[1]
	DateTime of haul start (Record the date and time the first buoy of the mainline is hauled from the water to start the haul[1]
	DateTime of haul end (Record the date and time the last buoy of the mainline is hauled from the water to end the haul)[1]
	Haul direction (Record whether the haul was from 1=Start to finish or 2=Finish to start)
	Latitude and longitude at start of set [2, 3]
	Latitude and longitude at end of set [2,3]
	Latitude and longitude at haul start [2,3]
	Latitude and longitude at haul end [2,3]
	Wire trace (For each set indicate whether wire trace was used: 0 (no wire trace used); 1 ("SOME LINES", e.g., the vessel used wire traces on certain branch line positions during the set); 2 ("ALL LINES", e.g., wire traces were used on all lines during the set))
	Use of shark line (a hook attached to the float or at the float line)
	Number of hooks in the set (Total number of hooks in each set)
	Number of hooks between floats
	Float line length (meters) (Length of the line that is attached to the floats)
	Branch line length (meters) (Length of the branch line)
	Was a shooter used? (Y/N) If yes, Line shooter speed (Line shooter speed (meters/second))
	Vessel speed (Vessel speed when setting (knots)) (OPTIONAL ONLY IF NO POSITIONS)
	Hook type (For each set, record the type of hook or hooks used using the IATTC hook code from the hook manual)
	Line shooter speed (Line shooter speed (meters/second))
	Hook size (For each set, record the size of the hooks used)
	Bait type (Predominant bait used e.g., fish, squid, artificial)
	Blue dyed bait used (Was the bait dyed blue? (Y/N))
	Number of light sticks (Record the number of light sticks used)
	Depth type: Shallow (<150 m) ( ) or Deep (>150 m) ( ). Check appropriate box
Catch data	Species: Provide the ASFIS species code and the scientific name for each species taken in the set
	Catch number: Provide the total number of fish (by species) (Total number of fish caught of each listed species)
	Catch weight: Provide the total weight (by species[4]) (Total weight[5] nearest kg) of fish caught
	Discarded/Released number (PROVIDE the NUMBER of this species DISCARDED or RELEASED)
	If Discarded/Released provide number of fish by FATE type: alive ( ), injured ( ), dead ( ), unknown ( ). Check appropriate box
Size and sex information for individual fish	If length (cm), weight (kg) or sex (male, female, unknown) data from individual fish are collected for a set, provide this information associated with the set information

[1] Record in vessel operational time in the format MM-DD-YYYY-hh:mm

[2] Record the latitude in degrees and minutes and indicate 'N' or 'S' for north and south, respectively

[3] Record the longitude in degrees and minutes and indicate 'W' or 'E' for east and west, respectively

[4] Species in Tables 1 and 2 (data provision specifications pursuant to Resolution C-03-05) and other species not included in these tables when available

[5] Indicate whether round weight, gilled and gutted, or other processing; if a conversion method was used to process sampled weights, provide a description of the methodology used for the conversions