RBE/Système d'informations halieutiques – Unité d'Economie Maritime - UMR 6308 AMURE (Ifremer/UBO/CNRS)
Christelle Le Grand • Mathieu Merzéréaud • Sophie Leonardi • Olivier Guyader

# SOCIOECONOMIC INDICATORS OF PROFESSIONAL FISHING:

# FRENCH GUIANA AND GUADELOUPE

## Methodological guide

# Table of contents

# 1.  Context and objectives

The production of socioeconomic and social indicators of professional fishing in overseas regions is an important element for monitoring the evolution of the fishing situation in these territories and evaluating the impacts of measuring the management of fishery sustainability. Although they have a specific status from the standpoint of the treaty with the EU, remote peripheral regions are concerned by the Common Fisheries Policy[1]. These regions are subject to the Community framework for the collection of fisheries data called the Data Collection Framework[2] which sets out the long-term data collection programme before its implementation by each member State in a national working plan.

For France and the Ministry of Agriculture and Food, the Direction of Maritime Fishing and Aquaculture (DPMA) is responsible for the national data collection programme (DCF), while the Statistical and Prospective Service (SSP)[3] coordinates the collection and the production of the economic and social indicators of fishing fleets. IFREMER is a partner of and contributor to the national programme of the DCF[4]. Regarding the economic and social section, the socioeconomic action[5] of IFREMER's Fishing Information System[6] contributes to the collection of economic data in both metropolitan France and in certain of its overseas territories. In the framework of the coordination organised by the SSP for mainland France, IFREMER carries out direct surveys in the field face-to-face with the owners and skippers of fishing vessels using a single questionnaire[7]. The Laboratory of Economics and Management of Nantes-Atlantique (LEMNA) collects accounting data from a network of management centres. The data collected are represented as indicators by fishing segments in the annual report of the CSTEP[8].

In the overseas regions, especially in French Guiana and Guadeloupe, economic field studies were performed in 2009 and 2011 (on the data of 2008 and 2010). A new campaign of economic surveys in French Guiana and Guadeloupe is underway in 2020 using data from 2019. The socioeconomic context of these regions, the specificities of local fisheries and constraints regarding data availability have led to

---

[1] The overseas regions having the status of remote peripheral regions are Guadeloupe and Saint Martin, Martinique, French Guiana, Reunion and Mayotte. In the EU, the Canary Islands (Spain), the Azores and Madera (Portugal) also benefit from this status.
[2] https://eur-lex.europa.eu/legal-content/FR/TXT/?uri=CELEX%3A32013R1380
[3] https://agreste.agriculture.gouv.fr/agreste-web/statisticons/ORGA-SSP/listeTypeStatisticon/
[4] https://sih.ifremer.fr/Le-SIH/Appui-aux-politiques-publiques/Application-en-France
[5] https://sih.ifremer.fr/Activite-socio-economie
[6] https://sih.ifremer.fr/
[7] Economic data survey programmes have been carried out by Ifremer since the beginning of the 2000s (Van Iseghem, S., Quillérou, E., Brigaudeau, C., Macher, C., Guyader, O., Daures, F. 2011. Ensuring representative economic data: survey data-collection methods in France for implementing the Common Fisheries Policy. Ices Journal Of Marine Science, 68(8), 1792-1799. Publisher's official version: https://doi.org/10.1093/icesjms/fsr112 , Open Access version : https://archimer.ifremer.fr/doc/00043/15419/)
[8] https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/2018-annual-economic-report-eu-fishing-fleet-stecf-18-07

the development of economic indicator collection and calculation methodologies[9]. The approach proposed permits estimating annual economic indicators, at the individual scale, using part of the data of the economic surveys performed on a representative sample of boats/fishermen and other sources of data every year. The objective of this document is to present the methodology used to calculate the economic indicators for the fishing fleets of French Guiana and Guadeloupe. The boats concerned are small fishing boats less than 12 metres long.

The methodology of collecting economic data by survey is presented in another document (Leonardi et al. 2020)[10].

---

[9] Guyader Olivier, Bellanger Manuel (2011). Methodology of calculating economic indicators for fishing fleets using different sources of data. Guadeloupe – French Guiana - Martinique.

[10] Leonardi, S., Le Grand C. Merzéréaud, M., Bettali, T., Blanchard, F. Mansuy, E.  Cisse, A., Guyader, O. 2020. Methodology of collecting socioeconomic data on fishing: French Guiana and Guadeloupe: 2020, Ifremer report-RBE-SIH-EM-BIODIVHAL. 18 p.

# 2. The data used

The production of economic indicators by boat makes use of different sources of data stored at the SIH of IFREMER[11]. This section describes the data used and the processes performed.

## 2.1 Presentation of data

### 2.1.1 Reference population

The reference population is that listed in the file Community Fishing Fleet (FPC), the technical and administrative characteristics of each boat (length, power, gauge, age, etc.) and the owners (age) are presented in this FPC file.

In French Guiana, the reference population is composed of boats less than 12 m in length listed in the FPC, actively used for fishing and registered in French Guiana. Shrimp trawlers longer than 12 m are excluded.

In Guadeloupe, the reference population is composed of boats less than 12 metres long listed in the FPC, actively fishing and registered in Guadeloupe, excluding St-Barthélémy and St-Martin.
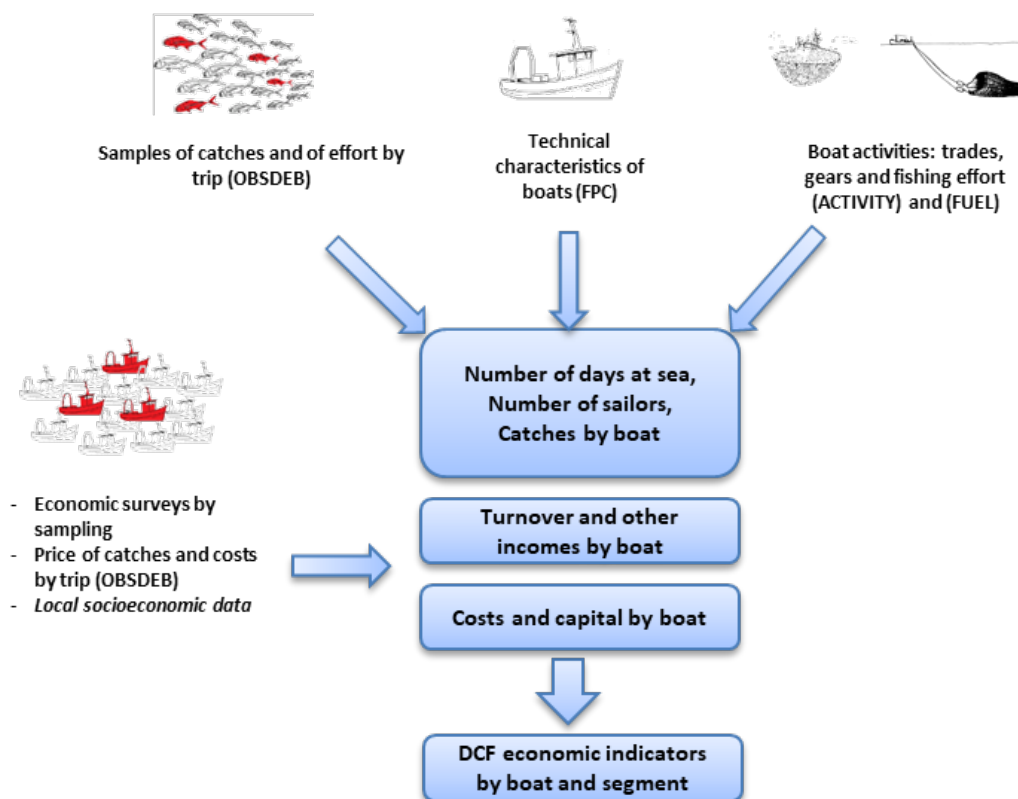


**Figure 1 : Sources of data required for calculating economic indicators.**

---

[11] https://sih.ifremer.fr/Donnees/Catalogue-de-donnees

### 2.1.2    Activity logs

The collection of activity logs is annual and concerns all the boats of the population listed in the FPC[12]. The activity log of a boat details for each month of the year considered whether the boat has been active or not, and if yes, the list of métiers practiced (métier means the implementation of a gear to capture one or more target species in a given fishing area). Besides these data, the log identifies each month the main port of operation, the average crew carried and the number of days at sea or of fishing.

This exhaustive identification of the activity of boats then permits stratifying the French fishing fleet into sub-fleets or segments (group of boats having homogenous production capacities and developing a common operational strategy). These exhaustive data permit in particular the stratification in segments known as DCF and in sub-fleets known as Ifremer for the reference population of the FPC.

### 2.1.3    Fishing effort: number of trips carried out by métier

The number of trips carried out by métier and by boat is a key variable for the amount of turnover and the variable costs estimated at this scale and must be available for each boat of the reference population. The sources of data used to evaluate the number of trips differ according to region.

**Table 1. Fishing effort data used for each region.**

| Region | Source of data | Cover / Scale / Frequency | Mode of processing |
|--------|----------------|---------------------------|--------------------|
| Guadeloupe | Refuelling Activity survey | Exhaustive Individual Annual | Algorithm |
| French Guiana | Count of departures from port combined with activity surveys | Almost exhaustive Individual Annual | Utilisation of raw information |

### 2.1.4    Catch data in quantity and value

Monitoring by sampling and unloading and effort by trip is performed continuously by observers at different points of unloading catches. The objective of this monitoring (OBSDEB)[13] is to characterise at the scale of each trip the production by commercial species and their exploitation on the market, the characteristics of the trip and the gears used, their size and the costs of the trip (fuel, bait, ice, food). The methodology of processing OBSDEB data is described in

---

[12] https://sih.ifremer.fr/Activite-socio-economie/Activite-des-navires
[13] https://sih.ifremer.fr/Debarquements-effort-de-peche/Obsdeb

a methodological report [14] that allows estimating in an effort database, the production data in quantity and in value by species as well as by métier and fleet segment or reference fleet. The OBSDEB action also produces production data in quantity and value (turnover) for each boat of the reference population.

### 2.1.5    Economic survey data

A direct survey is performed on a sample of fishermen representative of the diversity of local fishing activities. The questionnaire is an adapted version of that proposed by the economic surveys carried out for mainland France. It comprises questions aimed at obtaining information on:

- the costs of maintaining and renewing equipment (fishing gear, rigs and deck auxiliaries);
- the costs by métier and by standard trip;
- boat operating costs (maintenance and repair costs, taxes, social charges and various, etc.);
- the physical and economic evaluation of the initial investment in fishing (value of boat: hull, engine, equipment);
- the crew and method of payment.

Contrary to the survey carried out for mainland France, the turnover and total annual expenses are generally unavailable for small fishing vessels. As mentioned by Guyader et al. (2016)[15], this can be explained to a large extent by the fact that the fishermen do not know these values or do not want to communicate such information. This point has been tested and verified in the field.

### 2.1.6    The "Roles-Equipment" data (number of days of enrolment)

The "roles-equipment" data of boats are administrative information that informs on the number of sailors on board and the number of days employment by boat and by month.

### 2.1.7    INSEE data

To update certain data and take into account the evolution of inflation on the price of consumables (excluding fuel), the INSEE price index data of different regions are used (Source: IEDOM reports).

---

[14]Weiss, J., Demaneche, S., Guyader, O. 2020. Methodology of data collection and estimation of efforts and catches of coastal fisheries. PDG-RBE-STH-LBH. SIH-Ifremer Report 2018.

[15] Guyader, O. Léonardi, S., Merzereaud, M. 2016. Proposal of Ifremer's involvement in different sections of the DCF 2017-2020 Feasibility and methodologies of calculating economic indicators for fishing fleets in overseas departments, Ifremer report. 18 p.

## 2.2  Data processing and frameworks

Among the data presented above, some are available for each boat in an exhaustive way while other data are collected only for a sample of the population. In this case, the data available are processed to produce reference bases applicable to each boat as a function of its specific characteristics (effort, type of boat, métiers practiced, etc.). This section presents the reference bases used.

### 2.2.1  Dimension of fishing gear launched

The dimension of fishing gears (in number and size) launched for the trip is a key variable. Indeed, the resources employed for fishing, the number and size of the fishing gears deployed, reflect the strategy of the boat and its owner and directly influence the cost of the gears, one of the main costs of the boat. As indicated previously, these data are collected by sampling the catches and effort per trip (OBSDEB). The principle is to build a reference base of average dimension by trip, métier and boat. This reference base is built every year in the following way:

In French Guiana: The average size of a fishing gear used per trip, métier and boat is calculated on the basis of data directly observable in the OBSDEB sample of the year studied. A minimum of 5 values are required for minimal precision. The boat data for the year studied are privileged; if the sample is insufficient, it is widened to other years (starting with those closest). If the sample is still not large enough, it is widened to all the boats of the same type, the same port and the same class of length for the year studied by preference and increased by the other years if necessary. The sample can be expanded to boats of the same type and port, or to boats of the same type only, the year studied, increased by other years (the closest first), until a large enough sample is obtained.

In Guadeloupe: The average dimension of the fishing gear employed by trip, métier and boat is calculated using data directly observed in the OBSDEB sample of the year studied. A minimum of 5 values are required to ensure minimal precision. Boat data for the year studied are privileged, but if the sample is not large enough, it is widened to other years (starting by the closest), then to all the boats of the same type for the year studied and increased by other years if necessary.

### 2.2.2  Duration of trips

The average duration of the trip is information necessary to switch from the number of departures to the number of days at sea, when the trip lasts more than one day. The duration of the trip is also taken into account in the calculation of food expenses.

The average duration of the trip is collected via OBSDEB. The principle is to build a reference base of average durations by trip, métier and boat. This reference base is built each year in the following way:

In French Guiana: not applicable.

In Guadeloupe: the average duration by trip, métier and boat is calculated on the basis of data directly observed in the OBSDEB sample of year studied. A minimum of 5 values is required to ensure minimal precision. The boat data for the year studied are privileged but of the sample is not large enough, it is widened to other years, then to all the boats of the same type for the year studied by preference and increased for the other years if necessary.

### 2.2.3   Price of fuel

The price of fuel is indispensable for calculating the cost of fuel on the basis of the volume used. The price is fixed by the authorities and is the same at all the suppliers of the region. The reference base for fuel prices is established every year in the following way:

In French Guiana: an annual average price is calculated on the basis of the prices collected by observers at the distributors (CODEPEG) or by the Prefecture.

In Guadeloupe: the average price is calculated by type of fuel on the basis of data directly observed in the OBSDEB samples of the year studied.

### 2.2.4   Cost of food

The cost of food per trip is collected via OBSDEB but was also subject to a question in the economic survey performed in 2011 on the data of 2010. The principle is to build a reference base of food costs by type of boat. This reference base is established each year in the following way:

In French Guiana: the average cost is calculated by trip and by type of boat on the basis of data collected in the economic survey of 2011 (data for 2010). The prices are deflated to take into account inflation between 2010 and the year studied.

In Guadeloupe: an average cost is calculated by man and hour at sea (duration of the trip) by type of boat on the basis of data collected via OBSDEB for the year studied.

### 2.2.5   Cost of ice

The cost of ice per trip is collected via OBSDEB but was also the subject of a question in the economic survey performed in 2011 on the data of 2010. The

principle is to establish a reference base of the cost of ice per trip, métier and boat when the data are available (in Guadeloupe in particular) and by type of boat if not. This reference base is established each year in the following way:

<u>In French Guiana</u>: the average price of ice per trip and per métier is calculated by type of boat on the basis of the data collected in the economic survey 2011 (data for 2010). The prices are deflated to take into account inflation between 2010 and the year studied.

<u>In Guadeloupe</u>: the average cost of ice per trip, métier and boat is calculated on the basis of data directly observed in the OBSDEB sample of the year studied. A minimum of 5 values is required to ensure minimal precision. The boat data for the year studied are privileged, if the sample is insufficient, it is widened to the other years, then to all the boats of the same type for the year studied by preference and increased for the other years if necessary.

### 2.2.6    Cost of bait

The cost of bait per trip is collected via OBSDEB but was also the subject of a question in the economic survey performed in 2011 on the data of 2010.

<u>In French Guiana</u>: not applicable.

<u>In Guadeloupe</u>: the average cost of bait per trip, métier and boat is calculated on the basis of data directly observed in the OBSDEB sample of the year studied. A minimum of 5 values is required to ensure minimal precision. The boat data for the year studied are privileged, if the sample is insufficient, it is widened to the other years, then to all the boats of the same type for the year studied by preference and increased for the other years if necessary.

### 2.2.7    Cost of engine oil

The cost of engine oil per trip is collected via OBSDEB but it was also the subject of a question in the economic survey performed in 2011 on the data of 2010.
The cost of engine oil concerns only boats equipped with a two-stroke engine requiring a mixture of oil and gasoline to operate. These engines are used less and less by the boats of French Guiana and Guadeloupe.

<u>In French Guiana</u>: not applicable.

<u>In Guadeloupe</u>, for boats that have declared oil costs in OBSDEB for the year studied (and the closest years): the average cost of oil per tripe and boat is calculated on the basis of data directly observed in the OBSDEB sample of the year studied. A minimum of 5 values is required to ensure minimum precision. The boat data for the year studied are privileged; if

the sample is insufficient, it is widened to the other years. If the sample does not contain a minimum of 5 observations, the cost of the oil is nil for the boat.

### 2.2.8    Volume of fuel

The volume of fuel per trip is collected via OBSDEB but was also the subject of a question in the economic survey performed in 2011 on the data of 2010. The principle is to establish a reference base for the volume of fuel used per trip, métier and boat when the data are available (in Guadeloupe in particular) and by type of boat if not. This reference base is established each year in the following way:

> In French Guiana: the calculation of an average volume per trip and by type of boat on the basis of the data collected in the economic survey of 2011 (data for 2010).

> In Guadeloupe: These reference consumptions are required to estimate the effort of boats (fuel algorithm). The average volume of fuel per trip, métier and boat is calculated on the basis of the data directly observed in the OBSDEB sample of the year studied. A minimum of 5 values is required to ensure minimal precision. The boat data for the year studied are privileged if the sample is insufficient, it is widened to the other years then to all the boats of the same type for the year studied by preference and increased for the other years if necessary.

### 2.2.9    Unit cost of fishing gear

The unit cost of a gear is information collected in the economic survey performed in 2011 on the data for 2010. This cost is very variable as a function of the owner's strategy: to purchase quality and durable equipment, or to purchase cheaper equipment but replace it more often, etc. This annual unit cost includes the lifetime of the gear.

For both French Guiana and Guadeloupe, the reference base of gear costs is established in the following way:
- For each boat surveyed in 2011, the unit cost of a gear was calculated by adding the cost of renewing a gear and the cost of maintaining it.
- The average unit cost of a gear is calculated by type of boat and by métier.
- The prices are updated to take into account inflation between 2010 and the year studied.

When the size of the gear is not pertinent, the unit cost corresponds to the total cost of the gear.

### 2.2.10   Boat maintenance and repair cost

The cost of maintaining and repairing a boat is information collected in the economic survey performed in 2011 on the data for 2010. This cost is very variable

as a function of the owner's strategy and depends on the boat's activity: in general, the more active the boat, the higher its maintenance and repair costs.

In both French Guiana and Guadeloupe, the reference base of boat maintenance and repair costs is established in the following way:

- The (number of days at sea) of the boats surveyed is shared by class according to quartiles:

  In French Guiana: <75 d,75-140d,140-180d,>=180d
  In Guadeloupe: <60d, 60-120d,120-180d,>=180d

- The descriptive statistics (1st quartile and interquartile interval) of the maintenance and repair costs per type of boat and length class are calculated.

| Number of days at sea<br>*Gui \| Gua* | | Maintenance and repair cost |
|---|---|---|
| *< 75 \| < 60* | days at sea | fixed part(Q25) + ¼ IQ |
| *75-140 \| 60-120* | days at sea | fixed part(Q25) + 2 * ¼ IQ |
| *140-180 \| 120-180* | days at sea | fixed part(Q25) + 3 * ¼ IQ |
| *>= 180* | days at sea | fixed part(Q25) + 4 * ¼ IQ |

**Table 1: Calculation of maintenance and repair costs.**

- The reference base of maintenance and repair is calculated by type of boat by class of length and by class of number days at sea. It reflects the values observed in the sample: the more active the boat, the higher its costs. Thus, to calculate this reference base, the equation takes into account a fixed maintenance and repair value (quartile 25% - Q25) and part of the variable interquartile interval (IQ) as a function of the number of days at sea. The data thus calculated coincide with the data observed in the sample.
- The costs are updated to take into account inflation between 2010 and the year studied.

## 2.2.11   Other fitting out expenses

The other fitting out expenses is information collected in the economic survey performed in 2011 for the data of 2010. The reference base is established in the following way:

In French Guiana: the average of the other fitting out expenses is calculated by type of boat.

In Guadeloupe: the average of the other fitting out expenses is calculated by type of boat and length class.

The prices are updated by taking into account inflation between 2010 and the year studied.

### 2.2.12 Crew share

The crew share is information collected in the economic survey performed in 2011 for the data of 2010. The reference base is established in the following way:

> <u>In French Guiana</u>: According to the survey, all the owners (except 1) proposed a crew share of 50% and we assume that this practice has not changed since 2010. Thus, the crew share is fixed at 50% for all the boats.
> <u>In Guadeloupe</u>: calculation of the average crew share by class of crew members on board (1 sailor, 1-2 sailors, > 2 sailors).

### 2.2.13 ENIM categories

The ENIM category is information collected in the economic survey performed in 2011 for the data of 2010. The analyses performed on these data show an average ENIM category of 5 for the skippers and between 3 and 4 for the sailors.

Since the composition of each crew is known only by way of surveys, it is not possible to know this information for all the boats. The following rule is used in both French Guiana and Guadeloupe:

- ENIM category of the skipper: 5
- ENIM category of the rest of the crew: 4

### 2.2.14 Social insurance charges

The rates applied to calculate the social insurance charges are specific to overseas territories and stem in particular from ENIM[16] .

| Social charges | ENIM category | | | Assedic | All |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | | |
| ENIM crew members | 12.1%/**2** | 12.1%/**2** | 12.1%/**2** | | |
| ENIM employer owner on board | 4%/**2** | 4.4%/**2** | 8.8%/**2** | | |
| ENIM employer rest of crew | 4%/**2** | 4.4%/**2** | 8.8%/**2** | | |
| Family allowance[17] | | | | | 2.15% |
| Generalised social contribution[17] | | | | | 7.5%/**2** |
| Reimbursement of social debt[17] | | | | | 0.5%/**2** |
| Employer's unemployment benefit | | | | | |
| Employee's unemployment benefit | | | | | |
| Obligatory professional charge (committee taxes) | | | | | 1.5% |
| Apprenticeship tax | | | | | 0.75% |

**Table 2: Calculation rules of social charges (source: ENIM)**

---

[16] http://www.enim.eu/employeur/paiement-cotisations-et-contributions-sociales
[17] Source: Scale of charges imputable to sailor-fishermen by the CMAF.

### 2.2.15   Elements of capital

It is considered that the capital of a boat is broken down into 3 parts: the hull, the engine and the equipment (ice hold).

For each of these elements, a price per type of boat is defined:

In French Guiana: based on the data of the economic survey of 2011 (data for 2010). If the boat has been surveyed, the price declared in the survey is conserved. For the other boats, an average price per type of boat is calculated.

In Guadeloupe: based on the data collected by telephone surveys in 2017 performed on a sample of shipyards. An average price per type of boat is calculated.

These values are used as the basis of for calculating the capital and the depreciations.

### 2.2.16   Field Data: swim bladders

In French Guiana, the sale of swim bladders of species of acoupa provides additional income to owners and the crew, according to case. This income is calculated on the basis of acoupa production with the following ratios and prices:
  o Acoupa weakfish: "Acoupa toeroe":
    ▪ 1 kg of bladder for 60 kg of fish
    ▪ 110 euros/kg
  o Green weakfish: "Acoupa cambucu"
    ▪ 1 kg of bladder for 60 kg of fish
    ▪ 25 euros/kg

# 3. Calculations of economic indicators

The data presented in part 2 permit calculating the economic indicators defined in the framework of the DCF. These indicators are estimated for each boat of the population and then aggregated by fleet segment. In this section, the indicators required are presented as are the calculations performed to obtain them.

## 3.1 The economic indicators of the DCF

| Category | Indicator | Data source | Detail |
|---|---|---|---|
| **Income** | Turnover from fishing: Value of catches unloaded | Obsdeb | Individual data (Obsdeb processing) |
| | Other income (swimming bladders) | Other field data | Data by species (ratio and unit price) |
| **Effort** | Number of days at sea | Activity | Individual data |
| **Social variables** | Crew on board | Activity | Individual data |
| | Full-time equivalent | | |
| **Costs and capital** | Volume and cost of fuel | Economic survey 2011 (data for 2010) Obsdeb Role INSEE ENIM | Reference bases by type of boat applied to individual characteristics of boats |
| | Maintenance and repairs | | |
| | Other fixed costs: cost of gears, other fitting out costs | | |
| | Other variable costs: oil, bait, food, ice | | |
| | Wage costs | | |
| | Capital | | |

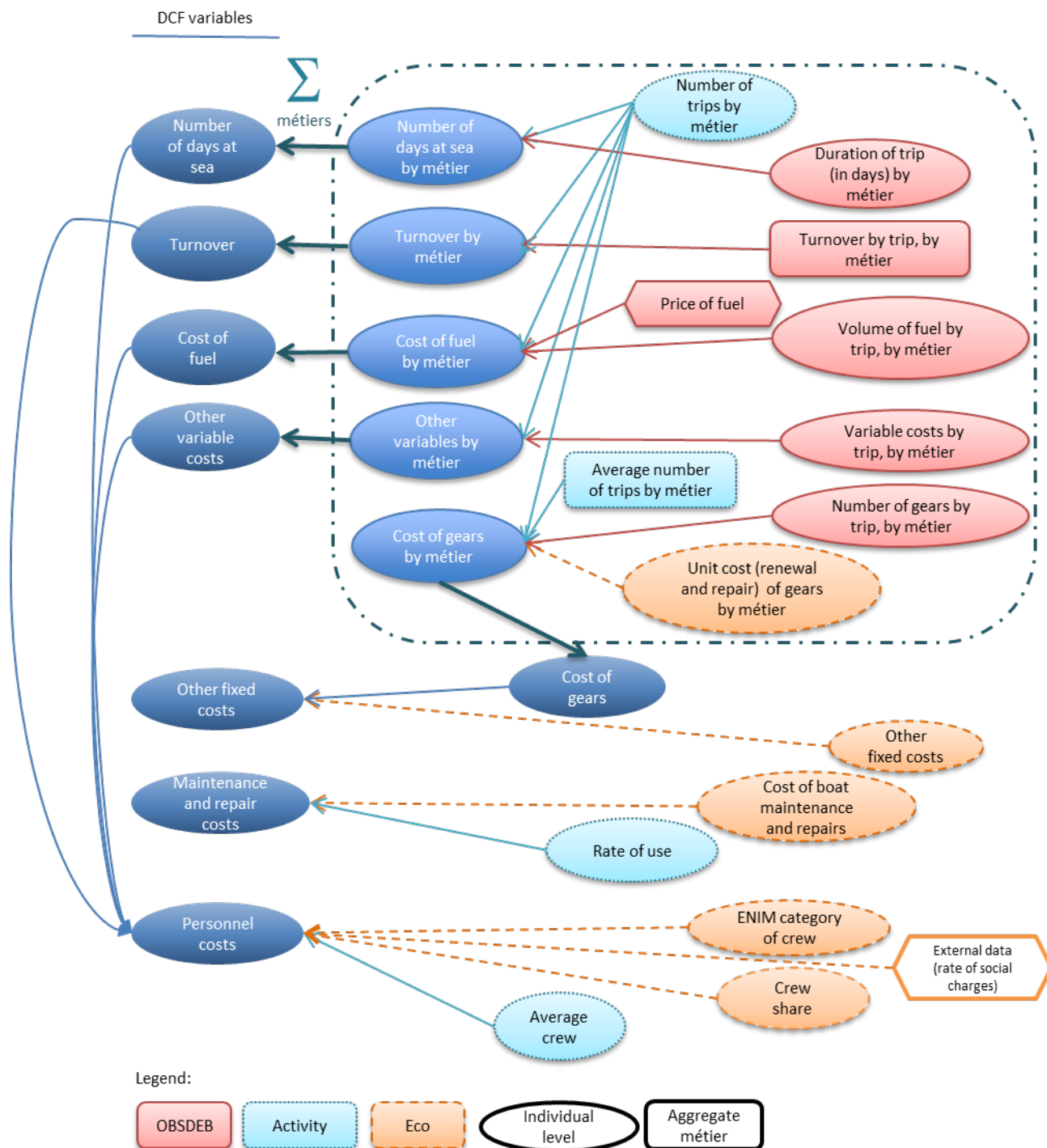**Table 3 : Economic indicators and data sources.**

**Figure 2: General principles of the calculation of economic indicators and data sources.**

## 3.1 Income

### 3.1.1 Turnover

The methodological report of OBSDEB[13] presents the estimation of the total productions (in quantity and value) per fleet DCF × size class × port of operation

× type of boat × métier. The following methodology is applied in order to calculate an estimation of the turnover per boat:

   In French Guiana: for each boat, the number of days at sea is obtained from the activity logs (exhaustive observation of the ports in French Guiana).
   
   o Calculation of a weight by boat = number of days at sea of the boat /number of days at sea of the combination type of boat*port
   
   $$w_{boat} = \frac{Number\ of\ days\ at\ sea\ _{boat,port}}{\sum_{type\ of\ boat,port} Number\ of\ days\ at\ sea}$$
   
   o The catches and values estimated at the level of the combination type of boat*port are then disaggregated at the level of the boat with the weight calculated by the previous step.
   
   $$TO_{boat} = TO_{type\ of\ boat,port} * w_{boat}$$

   In Guadeloupe: for each boat, the number of trips by métier is estimated using the fuel algorithm.
   
   o Calculation of a weight by boat*métier = number of trips of trips*métier/number of trips of the combination type of boat*métier
   
   $$w_{boat,métier} = \frac{Number\ of\ trips\ _{boat,métier}}{\sum_{type\ of\ boat} Number\ of\ trips\ _{métier}}$$

   o The catches and the values estimated at the level of the combination type of boat*métier are then disaggregated at the level of boat*métier with the weight calculated by the previous step.

   $$TO_{boat} = \sum_{métier} TO_{type\ of\ boat,métier} * w_{boat,métier}$$

The Obsdeb estimations are available per boat, species and métier. It suffices to aggregate these quantities and values by boat to obtain the fishing turnover. The price of species used in Obsdeb to calculate the value of sales takes into account the commercialisation circuit.

### 3.1.2  Other income

In French Guiana: The other individual incomes are composed of the sale of swimming bladders. They are calculated on the basis of productions by species and by boat for the species concerned to which specific rates (cf. Field Data: swimming bladders) are applied.

In Guadeloupe: not applicable.

## 3.2 Fishing effort, employment and full-time equivalent

### 3.2.1 Number of days at sea

$$Days\ at\ sea\ = \begin{cases} if\ duration\ of\ trip\ \leq 1day, number\ of\ trips \\ if\ duration\ of\ trip\ > 1day, number\ of\ trips\ \times average\ duration\ of\ trip \end{cases}$$

For each boat, the number of days at sea is the sum of monthly data available in the activity logs. To ensure consistency with the other Obsdeb outputs, the days at sea used are supplied by the Obsdeb team.

### 3.2.2 Average crew

For each boat, the average crew is the average annual crew filled-in the activity logs.

### 3.2.3 Full time equivalent (ETP)

$$ETP\ =\ \min(average\ crew;\ \frac{average\ crew * number\ of\ days\ at\ sea}{180})$$

The calculation of ETP per boat is the minimum value between the average crew and the average crew * number of days at sea / reference number of days at sea.

In mainland France, the reference number of days at sea is the European standard: 250 days.

In the overseas territories, this number is not pertinent given the importance of working time on land by the fishermen as much for the supplies (ice, fuel, etc.) of the boat as for the sale of their production. For these calculations, the standard number of days at sea chosen for the overseas territories is 180 days (corresponding to the quantile 80% of the number of days at sea in 2017).

## 3.3 Costs and capital

All the prices coming from the economic survey of 2010 are deflated.
The costs are calculated at the scale of the métier before being summed by boat.

### 3.3.1 Volume and cost of fuel

$$Volume\ fuel_{boat} = average\ volume\ by\ trip_{boat} * number\ of\ trips_{boat}$$

The individual volume of fuel is obtained by multiplying the average volume of fuel by trip and the number of trips of the boat.

$$Cost\ fuel_{boat} = Volume_{boat} * price\ of\ fuel$$

The cost of fuel is the volume multiplied by the price.

### 3.3.2 Maintenance and repairs

$$Maintenance\ repairs_{boat} = Maintenance\ repairs\ _{type\ of\ boat, level\ activity}$$

The cost of maintenance and repairs of the boat is the reference cost corresponding to the technical characteristics and activity of the boat.

### 3.3.3 Other fixed costs: cost of gears, other fitting out expenses

$$Fixed\ costs_{boat} = Cost\ gear_{boat} + Other\ fitting\ out\ expenses\ _{type\ boat}$$

$$\boldsymbol{Cost\ gear_{boat}} = \sum_{trade} \boldsymbol{cost\ gear\ _{trade} * dimension\ gear_{boat,trade}}$$

The other fixed costs are the sum of the cost of gears and other fitting out expenses.

The cost of gears is calculated for each boat and each métier, by multiplying the average unit cost of a gear by the dimension of the gears deployed in the water. The annual cost of gears is the sum of the costs by métier.

The other fitting out expenses correspond to the reference amount defined by type of boat.

### 3.3.4 Other variable costs: oil, bait, food, ice

The aggregate "other variable costs" is composed of oil, bait, food and ice costs, and landing taxes (none in these regions).

$$Other\ variable\ costs_{boat} = oil_{boat} + bait_{boat} + food_{boat} + ice_{boat}$$

$$bait_{boat} = \sum_{métier} cost\ bait\ trip_{métier,boat} * number\ of\ trips_{boat,métier}$$

$$ice_{boat} = \sum_{métier} cost\ ice\ trip_{métier,boat} * number\ of\ trips_{boat,métier}$$

$$oil_{boat} = cost\ oil\ trip_{boat} * number\ of\ trips\ _{boat}$$

$$food_{boat} = \begin{cases} cost\ food\ trip_{type\ of\ boat} * number\ of\ trips_{boat}, in\ French\ Guiana \\ \sum_{métier} cost\ food\ trip_{type\ of\ boat,man,time\ at\ sea} * crew_{boat} * trip\ duration_{métier,boat}, in\ Guadeloupe \end{cases}$$

To calculate these costs at the scale of a boat, the average cost is multiplied by the number of trips of the boat.

### 3.3.5 Personnel costs

The personnel costs are calculated in the same way as for mainland France (after adjustment of rates) and uses many types of data:

- The crew on board the boat and the number of days of enrolment come from the Role source, except in the case when the boat is not in the role file (source: activity).
- The ENIM categories of the crew.
- The crew part.

First the ENIM base to which the different social charges are applied is calculated. The ENIM base is calculated using flat rate salaries by ENIM category

of the crew and the number of days at sea. The rates of the charges differ according to whether the skipper is the owner on board or not.

$$ENIM\ base_{Skipper} = ENIM\ flat\ rate\ daily\ salary_{Skipper} \times Nb\ days\ at\ sea$$
$$ENIM\ base_{Crew} = ENIM\ flat\ rate\ daily\ salary_{Rest\ of\ crew.} \times Nb\ days\ at\ sea \times (crew - 1)$$
$$ENIM\ base_{Total} = ENIM\ base_{Skipper} + ENIM\ base_{Crew}$$

Different taxes are then calculated on the basis of the ENIM crew or Total base.

| Charges | ENIM base | | |
|---|---|---|---|
| | Crew | Skipper | Total |
| ENIM employee | | | x |
| ENIM employer owner on board | | x | |
| ENIM employer rest of crew | x | | |
| Family allowance | | | x |
| General SS charge Debt reimbursement | | | x |
| Employer unemployment allowance | | | x |
| Employee unemployment allowance | | | x |
| Obligatory professional charge | | | x |
| Apprenticeship tax | | | x |

Table 4: ENIM base used to calculate charges.

The employee and employer's charges are composed of the following taxes:

| | Social charges | |
|---|---|---|
| | Employee | Employer |
| ENIM employee | x | |
| ENIM employer owner on board | | x |
| ENIM employer rest of crew | | x |
| Family allowance | | x |
| General SS charge Debt reimbursement | x | |
| Employer unemployment allowance | | x |
| Employee unemployment allowance | x | |
| Obligatory professional charge | | |
| Apprenticeship tax | | x |

Table 5: Composition of employee and employer's social charges.

The net flat rate salary and paid holidays are deducted easily on the basis of the above information:

$$Net\ flat\ rate\ salary = ENIM\ base_{total} - Social\ charges_{employee}$$
$$Paid\ holidays = Net\ flat\ rate\ salary\ /\ 10$$

With all this information, the cost of the personnel can be calculated.
$$\begin{aligned}Cost\ of\ personnel = TO \\ - (Tax\ Deb. + Fuel + Oil + Bait + Food + Ice) \\ \times Share_{Crew} \\ + Social\ charges_{epatronales} + congés\ payés\end{aligned}$$

### 3.3.6 Capital

To calculate the items of capital, the prices of each item are depreciated as a function of the age of the boat:
- in French Guiana: hull, engine and ice hold;
- in Guadeloupe: hull, engine and fish aggregating device (FAD).

The age of the boat is known in the FPC file. Taking the assumption that the engine was new when the boat was built and that it has a lifetime of 5 years (it is changed on the 6th year), the age of the engine is equal to the age of the boat, modulo 6.

For the age of the ice hold, the assumption is taken that the population is equally distributed in each age of from 1 to 5 years (i.e. 20% of the population in each age).
- Calculation of engine age: age of the boat modulo 6
- Calculation of ice hold: hypoth.: 20% of the pop at 1 year / 2yr.... 5yr
- Age of hull: age of hull, source FPC

The cost of the capital and depreciation for the different items hull, engine and equipment (ice hold) are calculated according to the following hypotheses:
- the hull is amortised over 40 years (and is worth 0 after 40 years);
- the engine is amortised over 5 years and is changed every 5 years (10 years for inboard engines);
- the ice hold is amortised over 5 years (and is worth 0 afterwards).

For each item of the capital, the real value is calculated:
- $VA_{hull} = \left(1 - \min\left(\frac{age\ hull}{40}; 1\right)\right) \times price_{hull}$
- $VA_{engine} = \left(1 - \min\left(\frac{age\ engine}{5}; 1\right)\right) \times price_{engine}$
- $VA_{\text{Ice hold}} = \left(1 - \min\left(\frac{age\ \text{Ice hold}}{5}; 1\right)\right) \times price_{\text{Ice hold}}$, in French Guiana
- $VA_{\text{FAD}} = Cost\ renewal_{\text{FAD}}$, in Guadeloupe

The value of the capital is the sum of these items.

The items of the depreciation are calculated:
- $Deprec_{hull} = 1/40 \times price_{hull}$
- $Deprec_{engine} = 1/5 \times price_{engine}$
- $Deprec_{\text{Ice hold}} = 1/5 \times price_{\text{Ice hold}}$, in French Guiana
- $Deprec_{\text{FAD}} = Cost\ renewal_{\text{FAD}}$, en Guadeloupe

The amount of the depreciation is the sum of these items.

# 4.  Presentation of indicators

All these indicators calculated by boat are then aggregated by segment of DCF fleet, for the needs of the DCF or according to the IFREMER segmentation for more detailed analyses.

The presentation of indicators at the scale of the DCF requires clustering, i.e. grouping segments when they account too few boats to respect the rules of confidentiality.

In French Guiana: there are no clusters, the data are presented only for the DFN.

| Segment DCF | Nb boats | Presentation |
|---|---|---|
| OM DFN VL0010 | 48 | yes |
| OM DFN VL1012 | 57 | yes |
| OM DTS VL1824 | 13 | no |
| OM HOK VL1012 | 1 | no |
| OM FPO VL0010 | 1 | no |
| **Total** | **120** | |

**Table 6 : segments DCF In French Guiana en 2018**

In Guadeloupe:
o All the boats of 10 to 12 metres (distributed in 4 segments DCF) are grouped in the segment PGP VL1012;
o PGO VL0010 and PGP VL0010 are grouped in segment PGP VL0010.

| Cluster | Segment DCF | Nb boats |
|---|---|---|
| **OM DFN VL0010** | OM DFN VL0010 | 81 |
| **OM FPO VL0010** | OM FPO VL0010 | 88 |
| **OM HOK VL0010** | OM HOK VL0010 | 78 |
| **OM PGP VL0010** | OM PGO VL0010 | 7 |
| | OM PGP VL0010 | 219 |
| **OM PGP VL1012** | OM DFN VL1012 | 6 |
| | OM FPO VL1012 | 2 |
| | OM HOK VL1012 | 9 |
| | OM PGP VL1012 | 4 |
| **OM PS_ VL0010** | OM PS_ VL0010 | 16 |
| **Total** | | **510** |

**Table 7: DCF clusters in Guadeloupe in 2018**

# 5. Annexes

| Theme of questionnaire | Number of survey questions | Number of questions used to build the DCF variables | Ratio |
|---|---|---|---|
| 1. Information on respondent and their entourage | 9 | 3 | 33% |
| 2. Information on associated boats | 3 | 2 | 67% |
| 3. The boat | 9 | 8 | 89% |
| 4. Activity | 3 | 3 | 100% |
| 5. variable costs per catch and by trade | 1 | 1 | 100% |
| 6. fishing gears and rigging | 1 | 1 | 100% |
| 7. other operating costs | 4 | 4 | 100% |
| 8. Incomes | 9 | 7 | 78% |
| 9. Crew and mode of remuneration | 10 | 10 | 100% |
| 10. Conflicts of use | 2 | 0 | 0% |
| **Total (1 to 10)** **excluding 11. Survey researcher assessment** | **51** | **39** | **76%** |
| 11. Observer's assessment | 5 | | 0% |

**Table 8: Survey questions (level 2) and rate of coverage of questions used for the call for DCF data.**

| Theme of questionnaire | Questions | DCF variable |
|---|---|---|
| 1. information on respondent and their entourage | 1.1 Status of skipper | yes |
| | 1.2 Maritime diploma | no |
| | 1.3 Year started in trade | no |
| | 1.4 Other trade before fishing | no |
| | 1.5 Retired | yes |
| | 1.6 Higher level of education | no |
| | 1.7 Fishing family | no |
| | 1.8 Involvement of family | no |
| | 1.9 Trade of spouse/companion | yes |
| 2. Information on associated boats | 2.1 Work linked with boats | Yes |
| | 2.2 Operation of other boats | Yes |
| | 2.3 Status of company | No |
| 3. The boat | 3.1 Year boat was purchased | Yes |
| | 3.2 new construction | Yes |
| | 3.3 first purchase | No |
| | 3.4 percentage of ownership of boat | Yes |
| | 3.5 purchase price | Yes |
| | 3.6 share of loan to finance boat | Yes |
| | 3.7 Loan reimbursements | Yes |
| | 3.8 Insurance premium and value | Yes |
| | 3.9 Value of boat on second-hand market | Yes |
| 4. Activity | 4.1 Level of activity | Yes |
| | 4.2 main trades | Yes |
| | 4.3 licences | Yes |
| 5. Variable costs by catch and by trade | 5. Variable costs by catch and by trade | Yes |
| 6. fishing gears and rigging | 6 fishing gears | Yes |
| 7.other operating costs | 7.1 maintenance and repair of boat | Yes |
| | 7.2 other equipment expenses | Yes |
| | 7.3 various social charges | Yes |
| | 7.4 Bad weather fund | Yes |
| 8. Income | 8.1 turnover | Yes |
| | 8.2 turnover from swim bladders | Yes |
| | 8.3 sales circuit | Yes |
| | 8.4 Detail of turnover by species | Yes |
| | 8.5 Discarded catch at sea | No |
| | 8.6 Subsidies 2015-2019 | Yes |
| | 8.7 Diversification without boat use | Yes |
| | 8.8 Diversification with boat use | Yes |
| | 8.9 reasons for diversification | No |
| 9. Crew and mode of remuneration | 9.1 skipper alone on board | Yes |
| | 9.2 annual average crew | Yes |
| | 9.3 Crew turnover | Yes |
| | 9.4 number of foreign sailors | Yes |
| | 9.5 remuneration by share of catch | Yes |
| | 9.6 total annual cost of crew | Yes |
| | 9.7 Detail of personnel expenses | Yes |
| | 9.8 Salary of a sailor | Yes |
| | 9.9 ENIM category of crew | Yes |
| | 9.10 Employment of personnel on land | yes |
| 10. Conflicts of use | 10.1 conflicts of use | No |
| | 10.2 conflict with who? | No |

**Table 9: Detail of variables used to establish the DCF indicators.**