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# DOCUMENT SAC-11 INF-M

## MANAGING THE FLOATING-OBJECT FISHERY FOR TROPICAL TUNAS IN THE EPO:
### SUPPORTING INFORMATION FOR THE PRECAUTIONARY ADDITIONAL MEASURES RECOMMENDED BY THE STAFF

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**CONTENTS**



## SUMMARY

The IATTC staff's 2020 risk analysis (SAC-11-08) for the tropical tuna fishery in the EPO indicates that the current management measures (C-17-02), which expire at the end of 2020, are adequate in the short term. Nonetheless, the staff is recommending additional precautionary measures to ensure that these *status quo* conditions—defined as the average fishing mortality (*F*) during the most recent 3-year period (2017-2019)—are not exceeded, for two reasons:

1. For bigeye tuna, the risk analysis estimates a 50% probability that current fishing mortality ($F_{cur}$) is higher than the target reference point of maximum sustainable yield (MSY). However, the results of the risk analysis are bimodal (SAC-11-08), with a more pessimistic and a more optimistic group of models. The combined models in the pessimistic group indicate a 10% (or slightly higher) probability that the limit reference point has been exceeded;
2. Stock status indicators (SAC-11-05), in particular those for the floating-object (OBJ) fishery, show long-term trends that could lead to increased *F* in the near future, thus jeopardizing the desired effect of the current measures for the purse-seine fishery (72-day closure, the *corralito* closure, daily active FAD limits per vessel).

Although several types of management measures could be considered (*e.g*. measures described in IATTC-90 INF-B; IATTC-90 INF-B Addendum 1), the staff has focused on the following four options, all directly

[1] Postponed until a later date to be determined

applicable to controlling *F*, and/or already implemented in some form:

1. limit the number of floating-object (OBJ) sets;
2. adjust the limits on daily active FADs;
3. limit FAD deployments; and/or
4. adjust the duration of the closure to compensate for increases in OBJ sets.

The staff reviewed the advantages and disadvantages of each option, as well as potential solutions to mitigate or compensate the disadvantages. The staff weighed the management benefits against data and infrastructure shortcomings, which led it to conclude that a limit on floating-object sets for all purse-seine vessels, combined with individual-vessel daily active FAD limits, would be the best option for maintaining the *status quo* and thus preventing an increase in *F* within a management cycle. How the limit on the number of floating-object sets would be allocated among CPCs[2] or among vessels, or by some other arrangement, is a matter for the Commission to decide.

## 1. BACKGROUND

In 2018 the staff concluded that the results of its stock assessment of bigeye in the EPO were not reliable enough to be used as a basis for management advice to the Commission, and in 2019 extended this conclusion to its assessment of yellowfin (IATTC-94-03). The main problem with both assessments was that their results became overly sensitive to the inclusion of new data, in particular recent observations for the indices of relative abundance from the longline fishery (SAC-09 INF B; SAC-10 INF-F). These and other issues were addressed in the staff's workplan to improve the stock assessments for tropical tunas, which included, among others, external reviews of the assessments for bigeye and yellowfin, and has now been successfully completed. Neither review singled out a particular model configuration to replace the previous base case models, but both suggested a variety of alternatives for the staff to consider.

New benchmark assessments are available for bigeye and yellowfin (SAC-11-06, SAC-11-07). These assessments represent a fundamental change from the staff's previous 'best assessment' approach: they are the basis for a 'risk analysis', in which a variety of reference models are used to represent plausible alternative hypotheses (SAC-11-08). In 2020, the staff concludes that the overall results of the bigeye risk analysis do not support changing the duration of the purse-seine closure, for two reasons. First, the probability that the target $F_{\mathrm{MSY}}$ and $S_{MSY}$ reference points have been reached is at about 50%. Resolution C-16-02 does not specify an acceptable level of probability of exceeding these target reference points. However, the staff notes that 50% is a reasonable arbitrary reference level, considering that *S* will fluctuate around $S_{MSY}$ as interannual recruitment fluctuates, and *F* will likewise fluctuate around $F_{MSY}$ due to interannual fluctuations in catchability and distribution of effort among purse-seine set types. Second, the overall results of the risk analysis for bigeye indicate that, although the probability that the limit reference points have been exceeded is not negligible for both *F* and *S* (spawning biomass), it is below the threshold level of 10% specified in Resolution C-16-02 for triggering an action (SAC-11-08).

For precautionary reasons, however, the staff believes that the conservation and management measures that will replace Resolution C-17-02, which expires at the end of 2020, should include provisions to ensure that fishing mortality is not increased beyond the *status quo* ($F_{\mathrm{cur}}$)[3], for the following reasons. First, some of the models used in the risk analysis for bigeye are "pessimistic": combined, they indicate that the limit reference points for bigeye have already been exceeded by a probability of, or slightly over, 10% (SAC-11-08). Second, the stock status indicators (SAC-11-05), in particular those for the floating-object (OBJ) fishery, show long-term trends that, if they persist, would potentially lead to increased *F* in the near future, jeopardizing the desired effect of the current measures for the purse-seine fishery (72-day closure, the

[2] Members and Cooperating Non-Members of the IATTC

[3] Defined as the average fishing mortality (*F*) during the most recent three-year period (2017-2019)

*corralito* closure, daily active FAD limits per vessel).

This is not the first time that the staff is recommending precautionary measures for tropical tunas additional to the provisions of C-17-02: in both 2018 and 2019, it proposed measures to prevent further increases in fishing mortality (IATTC-94-03, FAD-04-01). Specifically, the staff recommended (a) reductions of the active FAD limits, and (b) a limit on the total number of floating-object and unassociated (NOA) sets. This combination (OBJ+NOA), rather than OBJ sets only, was mainly for practical reasons: it is difficult to obtain accurate data on numbers of sets, by type, in a timely manner, which would be necessary to implement such a limit, and the data cannot be verified until the trip is complete and they have been processed[4]. Moreover, small yellowfin are also caught in NOA sets, and the 2019 stock assessment of the species suggested that its status was potentially a concern and could benefit from a limit on such sets. The SAC did not support this recommendation (SAC-10 report, Sec. 13), mainly due to concerns about a possible "race to fish", but also about exceeding existing OBJ set limits, given their operational advantages over NOA sets in terms of locating fish, incidence of zero-catch sets, *etc*.

The staff is not proposing such a combined OBJ+NOA set limit in 2020, for three reasons: (1) yellowfin stock status is no longer a concern (SAC-11-07); (2) the possibility of exceeding existing OBJ set limits under a combined set limit is problematic; and (3) the staff recently developed a data verification algorithm to identify misreported set types in the observer data, and hopes to develop similar algorithms for other data sources.

However, the staff is still concerned about the potential for further increases in *F* for bigeye caused by the floating-object fishery, which would result in exceeding the *status quo*, and is thus recommending additional precautionary measures for this fishery. Those measures, outlined in SAC-11-15, are:

1. an annual limit on the number of floating-object sets, applicable to all purse-seine vessels; and,
2. individual-vessel limits on the number of active FADs, based on historical vessel-specific active FAD information.

This document presents the rationale for these two measures, their advantages and disadvantages, and for the two other additional measures considered, but not recommended, by the staff.

## 2. MANAGEMENT MEASURES CONSIDERED

Four measures for managing the purse-seine fishery on floating objects were initially considered by the staff:

1. limit the number of floating-object sets;
2. adjust the limits on daily active FADs;
3. limit FAD deployments; and/or
4. adjust the duration of the closure.

Although limiting total FADs at sea would be preferable to limiting active FADs or deployments, the number of FADs at sea, as well as their effects, are currently unknown, and cannot be estimated accurately with the data available to the staff. Therefore, the staff decided to consider limits on active FADs and/or on FAD deployments, which are both related to total FADs at sea, albeit in ways that are not currently well understood.

The intention is to avoid exceeding the *status quo*, using proven conservation and management measures and existing data collection, reporting, and processing systems whenever possible. The *status quo* ($F_{cur}$) is defined as the average fishing mortality ($F$) during 2017-2019, for consistency with the three-year window

[4] Combining OBJ and NOA sets for reporting purposes might preserve data quality by eliminating the incentive to report OBJ sets as NOA sets, as might occur with a limit on OBJ sets only.

used in the stock assessments, the derived management recommendations, and IATTC conservation resolutions since 2003.

### 2.1. Limit the number of floating-object sets

The staff recommends an annual limit on the number of sets on floating objects, applicable to all purse-seine vessels, equal to the average total number of such sets made by the purse-seine fleet during the most recent three-year period. The limit would thus be 15,987 OBJ sets, the annual average during 2017-2019 (SAC-11-03).

#### 2.1.1. Advantages

a. Directly controls the number of OBJ sets, which is related to fishing effort, and hence to *F*;
b. Data on numbers of sets, by type, are available near-real time from the weekly at sea radio reports transmitted from vessels with on-board observers[5];
c. Does not penalize the fleet segment targeting unassociated tunas;
d. Unlike the combined OBJ+NOA limit, does not allow the total number of OBJ sets to increase.

#### 2.1.2. Disadvantages

a. Can lead to a 'race' among vessels to make as many OBJ sets as possible before the limit is reached. This may lead to changes in vessel behavior, such as switching effort between set types, which are hard to predict, may not maintain the *status quo*, and may promote inefficient or unsafe practices, such as poor selection of fishing options or fishing in unfavorable sea conditions.
b. May incentivize misreporting of information, including set type[6], which could compromise the data used in stock assessments, and scientific work in general, because set type is one of the criteria for deciding which vessel wells to sample in the IATTC port-sampling program.
c. Real-time monitoring of all purse-seine vessels would require an additional data reporting mechanism for vessels without on-board observers.
d. The relationship between the number of sets and *F* may not be proportional, and may be variable.

#### 2.1.3. Potential solutions

a. Distributing the fleet-wide OBJ set limit as annual individual national and/or vessel limits could reduce or eliminate a 'race' to make OBJ sets.
b. An algorithm for predicting set type from a broad spectrum of data recorded by observers was recently developed (FAD-03b), and could be adapted to identify misreported set types, although not in near-real time. Such a data screening algorithm might be developed for the FAD form or logbook data recorded by vessel personnel, but may not perform as well, because observer data are much more detailed.
c. Vessels without observers could be required to transmit the same weekly catch and effort data sent by observers.

[5] Includes all IATTC Class-6 purse-seine vessels (carrying capacity > 363 t), and occasional observed trips by smaller vessels (Classes 1-5).

[6] In addition to any sets misreported by unobserved vessels, on-board observers may be pressured to record OBJ sets as NOA sets. Reports of attempts to pressure observers to misreport data have arisen under the Agreement on the International Dolphin Conservation Program (AIDCP), which includes 'observer interference' as a possible infraction.

### 2.1.4. Rationale for staff recommendation

Besides directly controlling fishing effort, and hence *F*, the staff considers that the advantages of a limit on OBJ sets far outweigh the disadvantages, making an OBJ set limit essential to not exceed the status quo. The fleetwide limit would apply to all purse-seine vessels (IATTC Classes 1-6) because Class 1-5 vessels accounted for 30% of OBJ sets during 2017-2019 (SAC-11-03). If allocation is desirable, this limit could be allocated in several ways, including annual country or individual vessel allocations. General considerations regarding the various options for allocation have been discussed previously (*e.g.,* IATTC-90 INF-B; IATTC-90 INF-B Addendum 1), and apply here as well.

The data sources for evaluating this limit in near real-time would be at-sea radio reports made by observers and fishers, but over the course of the year, as observer data and logbook data become available on the IATTC permanent database, those edited data sources would be used in place of radio reports to update the set tallies. Because the set type data will need to be verified with data-screening algorithms, which can only be done once the data are part of the IATTC permanent database, there may be delayed corrections to the near real-time tallies of OBJ sets.

## 2.2. Adjust the limits on daily active FADs

The staff recommends individual-vessel limits on the daily number of active FADs[7], computed independently for each vessel from its active FAD data for 2018-2019 (data prior to 2018 have not been provided to the IATTC staff).

Resolution C-17-02 requires CPCs or their vessels to report, on a monthly basis, daily information on all active FADs to the Secretariat[8] and established capacity-class limits to control fishing mortality in the OBJ fishery (vessels with higher number of active FADs may make more OBJ sets or have increased efficiency, Lopez *et al*. (2014)). However, vessels in the same capacity-class can have different strategies in the use of FADs and any fleetwide or capacity-class restrictions will impact some vessels more than others. Because the motivation is not to exceed 2018-2019 active FAD levels, the staff believes that, unlike with adjustments to capacity-class limits in C-17-02, individual-vessel daily active FAD limits would prevent, or severely limit, vessels increasing their use of active FADs with respect to the *status quo*.

### 2.2.1. Advantages

a. Since 2018, a limit on active FADs has been in force (Resolution C-17-02), and a system for collecting and reporting these data already exists. During 2018-2019, 156 vessels reported active FAD data, partially or continuously (Figures 1 and 2). About 75% of the vessels reported during at least 12 months and 50% reported during at least 20 months (Figure 3). Annually, vessels reporting buoy data accounted for over 80% the total number of sets on floating objects (Figure 4).
b. In general, vessels with higher numbers of active FADs make more OBJ sets, suggesting a potential relationship between active FADs and OBJ sets, and ultimately *F* (Figures 5 and 6).
c. Improves data quality by enabling data recorded on FAD forms, in vessel logbooks, and by observers to be checked against buoy data provided by buoy manufacturers, directly or via governmental or national verification entities.
d. Active FAD data are already required to be reported to the staff monthly for all purse-seine vessels.

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[7] Resolution C-17-02 defines a FAD as 'active' when it is deployed at sea and the attached satellite buoy starts transmitting its location. FADs must be activated exclusively aboard a purse-seine vessel.

[8] FADs are currently identified using satellite buoys, per Resolution C-19-01

e. If individual-vessel limits on daily active FADs are established, vessels could not increase the use of active FADs with respect to the *status quo*, unlike with adjustments to capacity-class limits in C-17-02.

#### 2.2.2. Disadvantages

a. The relationship between the number of active FADs and the number of OBJ sets per vessel appears to be poor for some, if not all, fleet segments (FAD-04-01) (Figures 4 and 5), and thus, it may not be very effective at controlling fishing effort and, ultimately, F. For example, some active FADs may not be viable for fishing and therefore do not influence the number of sets. Other factors (i.e. environment, soak time, trajectory, species' aggregative behavior, spatial and temporal components, other operational characteristics) may influence this relationship, which may vary over time.
b. Independent verification of the reported data is not available.
c. Vessels may share FADs, making the measure less effective.
d. Although C-17-02 forbids remote activation of FADs, vessels can remotely deactivate and activate FADs, potentially increasing the total number of monitored FADs with respect to the *status quo*, making the measure less effective.
e. Not all vessels that appear to be using FADs are currently reporting active FAD data or have provided data for only part of the 2018-2019 period (see information above and Figures 1-4).
f. There is a wide variation in the use of FADs (Figure 2), and any fleetwide or capacity-class limits will impact some vessels more than others.

#### 2.2.3. Potential solutions

a. As noted previously (*e.g*. IATTC-94-02, SAC-10-19, FAD-03 INF-B), access to the following data would help the staff to conduct independent verification of the active FAD data, as well as progress in understanding the relationship between active FADs and number of sets:
    i. High-resolution buoy data (ideally the same daily raw buoy data received by original users; *i.e*. vessels, fishing companies);
    ii. VMS data (to check for remote deactivation/activation).
b. Improving data reporting, as mandated under C-17-02, would make available active FAD data for all vessels that are required to report and allow for more accurate estimates of active FADs per vessel and globally.

#### 2.2.4. Rationale for staff recommendation

The staff considers that establishing annual individual vessel limits on the number of daily active FADs is essential to maintaining the status quo. Vessel-specific limits will prevent the total number of active FADs from increasing because each vessel will be limited to its level of FAD use over the last two years. Moreover, by limiting active FADs per vessel, the number of deployments would be indirectly limited to some extent, provided remote deactivation and activation does not occur or is not widespread (i.e. Resolution C-17-02 prohibits remote activations). It is noted that within the current class categories specified in C-17-02, there are very different FAD fishing strategies (see section 3.1 in FAD-05-INF-A), and adjusting the current capacity-class limits, e.g., decreasing those limits to the average (or any other similar metric), would have a significant adverse effect on a number of vessels unnecessarily because the goal of the measure is to maintain the *status quo*. Some vessels would have to reduce their number of active FADs substantially while others would be allowed to increase their number of active FADs (Figure 2).

Regarding the computation of a daily limit for each vessel, there are a number of options, among which, for instance, establishing that the daily limit would be equal to the average of the maximum monthly (to account for seasonality) number of active FADs that the vessel reported during 2018-2019. In addition, all data from months during which the vessel would have observed a closure period would be excluded, since active FAD data reported during closure periods may not represent accurate fishing/operational strategies for many vessels; Figure 1~~)~~. The Secretariat considers this would be the best option, without prejudging the final decision that the Commission would have to make in this respect. It would be necessary also to adopt a computation method for vessels that have reported fewer than 12 individual months with active FAD data during 2018-2019: a good option would be to request that they submit any missing data by 30 November 2020, when their respective daily limits would be computed. Finally, there is another category of vessels that should be addressed appropriately, those which have never reported active FAD data in the last two years, because they were not fishing on FADs during that period, because they were not fishing in the EPO, or because they simply didn't report any data. Under the computation method described above, their adjusted limit would be zero, which might be consistent with the idea of a status quo but certainly would be perceived as discriminatory for the vessels and for the flag Member concerned. For some of them, computation might be made on the basis of the active FAD data for the last two years that were to be provided for these vessels. But, for the other vessels, those that have never fished on FADs and would wish to do it, including in an accessory manner, it may be concluded that the best way forward would be to develop an equitable solution, still to be analyzed and defined, compatible with the general thrust of these recommendations.

### 2.3. Limit FAD deployments

The staff does not recommend limits on the number of deployments as the issues listed below do not outweigh the potential management benefits, and an individual vessel limit on daily active FADs would indirectly control deployments.

#### 2.3.1. Advantages

a. Indirectly limits numbers of FADs at sea.
b. Mitigates the issue of remote activation.
c. Observer data on FAD deployments are available for IATTC Class-6 vessels.
d. Potential for data reporting via the FAD form for IATTC Class 1-5 vessels.
e. Apparent relationship between number of deployments and number of OBJ sets per vessel, for at least the segment of the fleet fishing mostly on their own FADs (Lennert-Cody *et al.* 2018).

#### 2.3.2. Disadvantages

a. The number of FADs at sea largely depends on recoveries.
b. FADs may be deployed for purse-seines by unmonitored vessels (e.g. cargo and/or longline vessels). Without added data collection systems, no information on these deployments will be available, making the measure less effective.
c. Deployments are not always directly visible to the observer (e.g., night deployments).
d. Data submission for the FAD form is currently incomplete, limiting the deployment information available for Class 1-5 vessels.
e. Would require modifications to/addition of data reporting infrastructure to obtain data in near real-time.
f. May incentivize misreporting of information.
g. Although promising, technologies that could help recording deployments in an independent manner are not implemented yet in the EPO (e.g. Electronic Monitoring Systems, EMS).
h. No verification algorithms currently exist for detecting misreported FAD deployment data, and it is unclear whether a useful algorithm could be developed with existing information.

#### 2.3.3. Potential solutions

a. Improving reporting rates and data quality for the FAD form would increase available data on deployments for Class 1-5 vessels.
b. Implementing an EMS program in the EPO would greatly assist with obtaining more accurate tallies of FAD deployments for all vessel size classes (SAC-11-11).
c. The at-sea radio weekly reporting system used by observers could be modified to provide deployment information in near real-time.
d. As noted above, access to high-resolution buoy data and VMS data could allow independent estimation of deployments per vessel.

#### 2.3.4. Rationale for staff recommendation

On balance, the staff considers that the issues noted above are likely to undermine any such measure, possibly promoting deployments through alternative means and compromising observer integrity and data quality. This is in contrast to an OBJ set limit, which may also potentially compromise data quality, but has direct management benefit, and there is reason to believe that compromised data may be detectable through analysis. Besides, if individual vessel active FAD limits are implemented, deployments would indirectly be restricted.

### 2.4. Adjustments to days of closure

Temporal closures are one of the most effective management measures to control *F*. Overall risk analysis results indicate the current 72-day closure for the purse-seine fleet to be appropriate. Any modification to its duration would require forecasting future OBJ sets. However, current methods for forecasting OBJ sets are considered unreliable. Thus, the staff does not recommend adjustments to the days of closure.

#### 2.4.1. Advantages

a. A measure specifying days of closure has already been adopted by the Commission (e.g. Res. C-17-02).
b. Observers, FAD forms and vessel logbooks would not be the data sources, thereby eliminating incentives for misreporting for those data sources.
c. Does not generate additional data demands and/or additional infrastructure needs for data processing.
d. Does not require near real-time monitoring of the fishery.

#### 2.4.2. Disadvantages

a. The dolphin-associated (DEL) and NOA fisheries will also be impacted, despite the fact that the current yellowfin tuna assessment indicates that the stock is healthy.
b. Requires a forecast estimate of the future number of OBJ sets; currently this is done assuming a simple linear trend, which may not adequately describe the relationship.
c. The relationship between days open (365 – days of closure) and number of OBJ sets may not be proportional and may be variable.

#### 2.4.3. Potential solutions

a. Work is underway to investigate the relationship between days of closure and number of sets, including uncertainty about that relationship.

#### 2.4.4. Rationale for staff recommendation

Due to the uncertainty about the future number of OBJ sets, this approach is not recommended.

## 3. CONCLUSIONS AND DISCUSSION

When management benefits are weighed against data and infrastructure issues, the staff concludes that a fleetwide limit on OBJ sets for all IATTC vessel size classes (i.e. 15,987 OBJ sets, the 2017-2019 average), combined with individual-vessel active FAD limits (to prevent a potential increase in number of FADs at sea and an increase in efficiency, among others), will provide the best option not to exceed the *status quo*, preventing an increase in *F* in the short term. The allocation method for the fleetwide annual limit on OBJ sets would need to be decided by the Commission, but could be by CPC or by vessel. Relevant material on options for allocation methods can be found elsewhere (e.g., IATTC-90 INF-B; IATTC-90 INF-B Addendum 1).

A fleetwide limit on active FADs is not proposed by the staff because the active FAD measures and data are by vessel and currently some vessels do not report, or report incompletely (Figure 1-4). To define a fleetwide limit, it would be necessary to extrapolate to those vessels that did not report during the past two years, which would be problematic without an accurate relationship between vessels' operational characteristics and the number of active FADs. This relationship cannot be obtained by grouping vessels according to their capacity class categories, as is done in C-17-02, because, as illustrated elsewhere (e.g. section 3.1, FAD-05-INF-A), FAD fishing strategies differ even within the capacity categories.

There are several additional measures that have the potential to increase the effectiveness of the conservation and management measures that are recommended by the staff in this document. For instance, limiting purchases of buoys, as is done by the Indian Ocean Tuna Commission (see Resolution 19/02), would help to control the number of deployments and the amount of activations, potentially making the active FAD limits more effective. Also, the development of an automatic, electronic FAD identification system (see unfunded proposal document) would greatly facilitate identification of FADs throughout their lifetime, allowing a better understanding of the relationship between operational characteristics, active FADs, catches and, ultimately, number of sets. Such data, along with the high-resolution buoy data and VMS information, might also provide the information necessary for future conservation and management measures based on the most appropriate global number of FADs at sea, which would be preferable to limiting active FADs or FAD deployments. In fact, these types of data have been shown to be of unquestionable scientific value in the management of tuna stocks (e.g. SCRS/2019/075).

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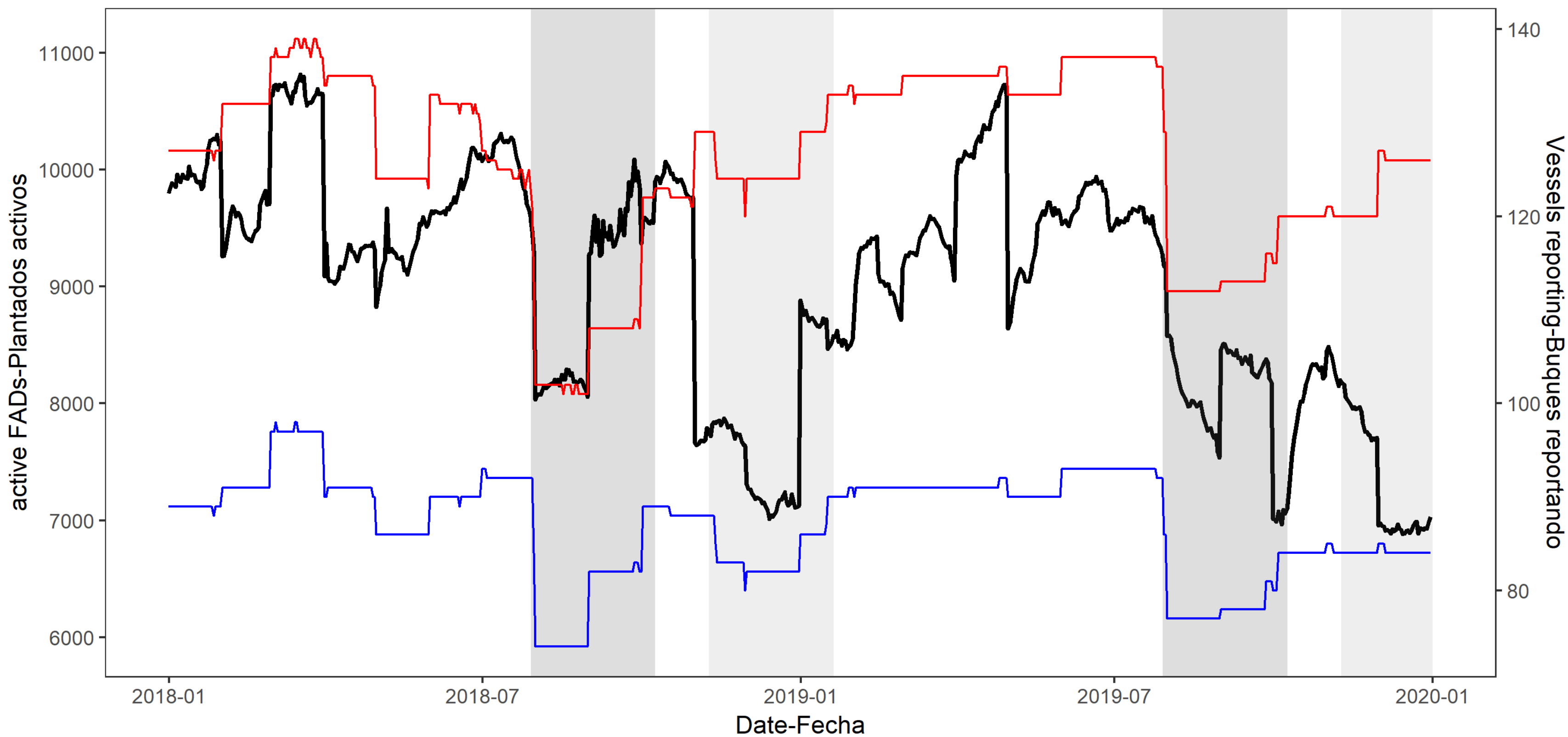


**FIGURE 1**. Number of active FADs reported by the purse-seine fleet in 2018-2019 (black line) and number of vessels reporting daily (red: total; blue: Class-6 vessels). Shaded areas correspond to closures.

**FIGURA 1.** Número de plantados activos reportados por la flota cerquera en 2018-2019 (línea negra) y número de buques que reportan diariamente (rojo: total; azul: buques de clase 6). Las áreas sombreadas corresponden a las vedas.


**FIGURE 2.** Evolution of daily active FADs per vessel and class, 2018-2019. Each color represents a vessel (156 total). Points are used to show data reporting gaps per vessel. The following class and class-limits are considered: Class 6 ≥ 1,200 $m^3$ = 450 (6.a in the figure); Class 6 < 1,200 m3 = 300 (6.b in the figure); Class 4-5 = 120, Class 1-3 = 70.

**FIGURA 2.** Evolución de plantados activos diarios por buque y clase, 2018-2019. Cada color representa un buque (156 en total). Los puntos se utilizan para mostrar las lagunas en la notificación de datos por buque. Se consideran las siguientes clases y límites de clase: Clase 6 ≥ 1,200 $m^3$ = 450 (6.a en la figura); clase 6 < 1,200 $m^3$ = 300 (6.b en la figura); clases 4-5 = 120, Clases 1-3 = 70.

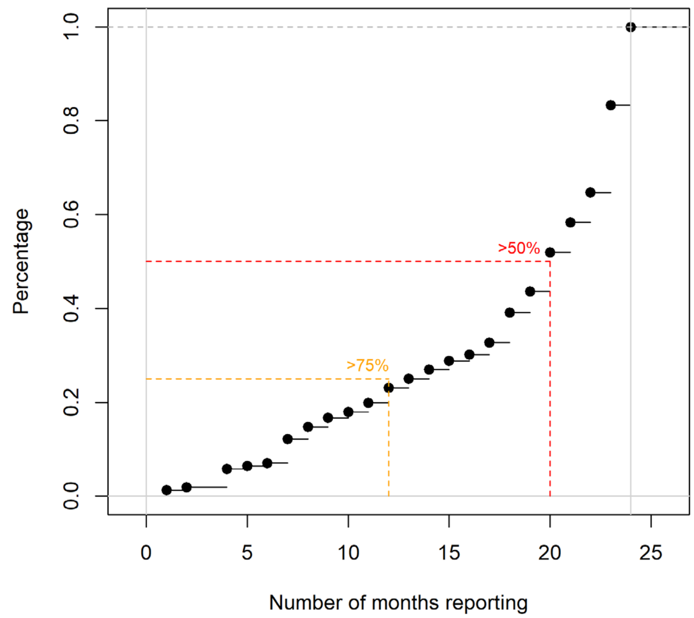


**FIGURE 3.** Cumulative percentage of vessels reporting buoy data during 2018-2019.
**FIGURA 3**. Porcentaje acumulativo de buques que reportan datos de boyas durante 2018-2019.

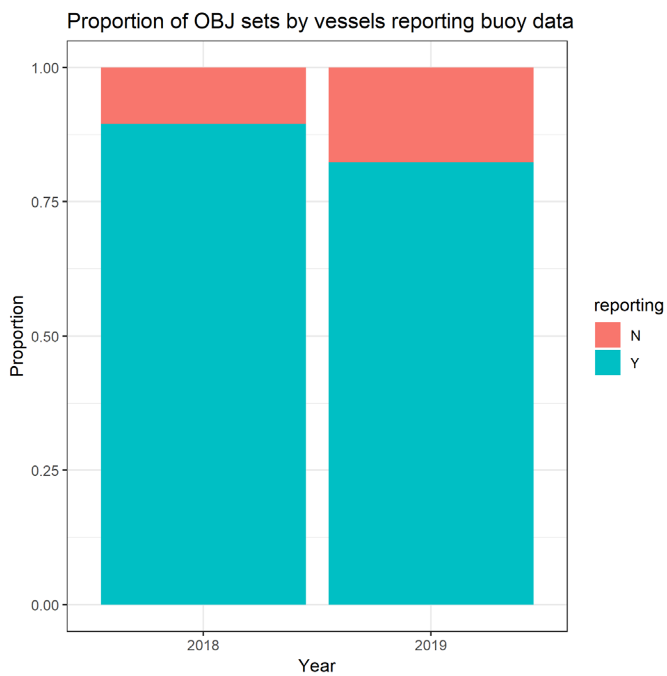


**FIGURE 4**. Proportion of OBJ sets by vessels reporting (blue) or not-reporting (red) buoy data for 2018 and 2019.
**FIGURA 4.** Proporción de lances OBJ por buques que reportan (azul) o no reportan (rojo) datos de boyas para 2018-2019.

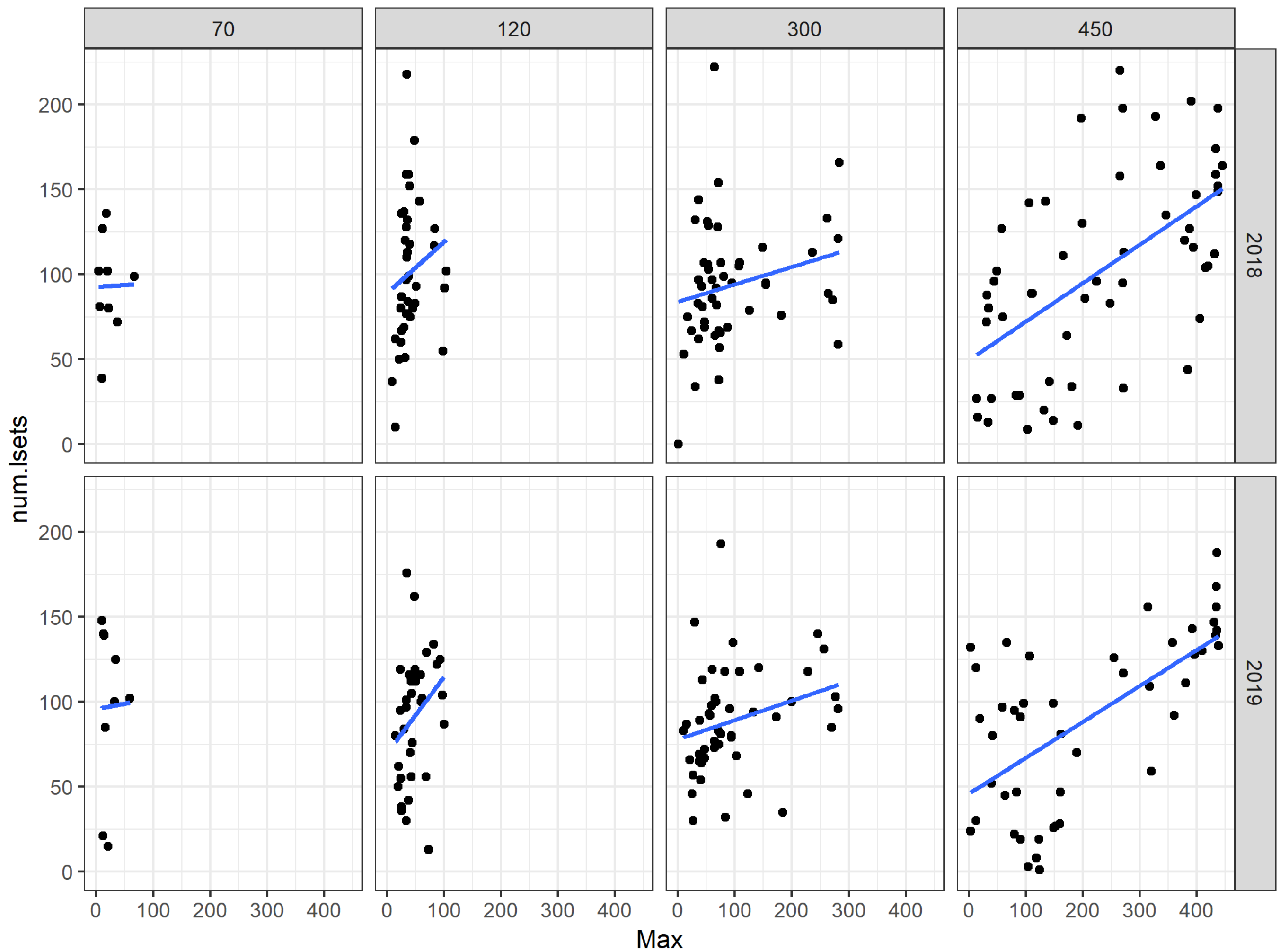


**FIGURE 5.** Relationship between maximum number of active FADs and number of OBJ set per vessel and year for each limit class, as specified in Resolution C-17-02.
**FIGURA 5.** Relación entre el número máximo de plantados activos y el número de lances OBJ por buque y año para cada límite de clase, como se especifica en la resolución C-17-02.

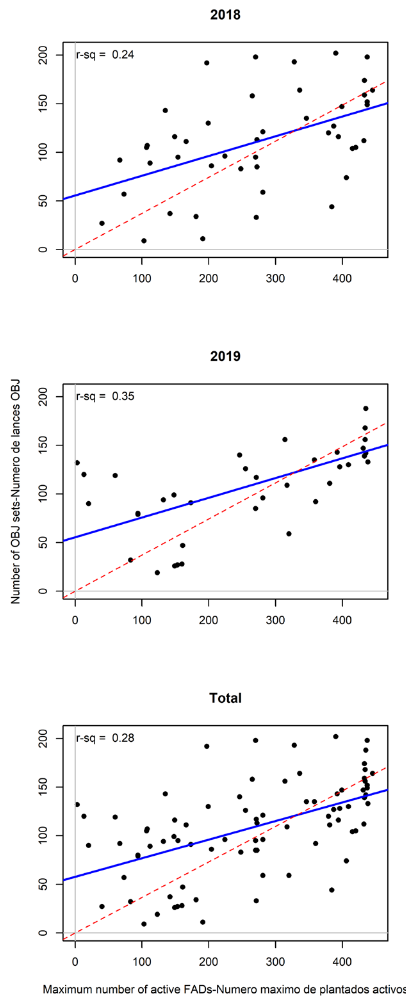


**FIGURE 6**. Relationship between maximum number of active FADs and number of OBJ sets per vessel and year for the segment of the fleet that mostly fishes on their own FADs (see section 3.1 of FAD-05-INF-A for details on fleet segments and fishing strategies).
**FIGURA 6.** Relación entre el número máximo de plantados activos y el número de lances OBJ por buque y año para el segmento de la flota que pesca principalmente sobre sus propios plantados (ver Sección 3.1 del documento FAD-05-INF-A para detalles sobre los segmentos de la flota y las estrategias de pesca).