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ADJUSTING CURRENT FAD LIMITS TO MEET 2019 STAFF RECOMMENDATIONS FOR TROPICAL TUNA MANAGEMENT IN THE EASTERN PACIFIC OCEAN

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Background

- The staff's **stock assessments** were found to be **extremely sensitive** to new data and to previously-identified issues in the assessment.

- Because of this, the results of the assessments, particularly the ***F* multiplier, could not be used** as a basis for management advice.

- However, the stock status indicators suggested that **fishing mortality is continuing to increase**, especially due to increases in the number of **floating-object sets**.

- In 2018 and 2019, the **staff recommended limiting the number of floating-object and unassociated sets combined**. However, this recommendation was **not supported** by the Scientific Advisory Committee.

- In response to requests to investigate **alternative measures**, the staff has developed an approach that meets conservation and management needs by **adjusting the active fish-aggregating device (FAD) limits** currently in force under Resolution C-17-02.

Data

- Three main datasets were used in the study:

1. **Daily active buoy data** for 152 vessels (**Classes 1-6**) during 2018. Daily vessel coverage and reporting rates vary by size class and month (min = 99, mean = 123, max = 138).

2. **2009-2018 AIDCP observer data for Class-6 vessels**, which contain FAD-related information (e.g. deployment, origin, sets).

3. **Catch and effort data for all vessels (Classes 1-6)**, from observers and vessel logbooks. This dataset provided information on a series of fisheries metrics per vessel used in the exploratory and modelling stages, including number of OBJ sets, days fishing, OBJ catch, catch per days fished.

Methods – assumptions

- **All FADs** deployed or modified were **identified** (Resolution C-18-05) **with buoys**.
- All FADs were **deployed with an active buoy** (Resolution C-17-02).
- **Buoys** that were deactivated were **not remotely reactivated** (Resolution C-17-02).
- The numbers of FADs used, and **buoy management and use practices, are similar** for vessels that reported and for vessels that did not report buoy data.
- The **maximum number of active FADs** used by a vessel is a better index of actual buoy use than the average number of active FADs, due to the fishing strategies (i.e. vessels usually deploy FADs at the beginning or end of the trip).
- The buoy management and use practices of **vessels that fish mainly on floating objects are more representative** for the current analysis than those of vessels that interact with FADs in a more opportunistic manner.

Methods – assumptions (2)

- A vessel's **fishing activity** is **positively related** with the availability of, and access **to, monitored FADs**. Therefore, **a reduction** of a vessel's active FADs **should lead to a reduction** in the number of FAD sets, and hence **OBJ sets**, by the vessel.

- Because vessels that fish on FADs opportunistically rely on the general availability of FADs at sea, **an overall reduction in the number of FADs will affect their OBJ-related fishing activities**, in a similar way.

- When new active FAD limits are implemented, only vessels using more FADs than the limit are impacted (i.e. **vessels using less FADs than the limit do not increase** their FAD use to the limit).

Methods – analysis

- Three types of analyses, were conducted:

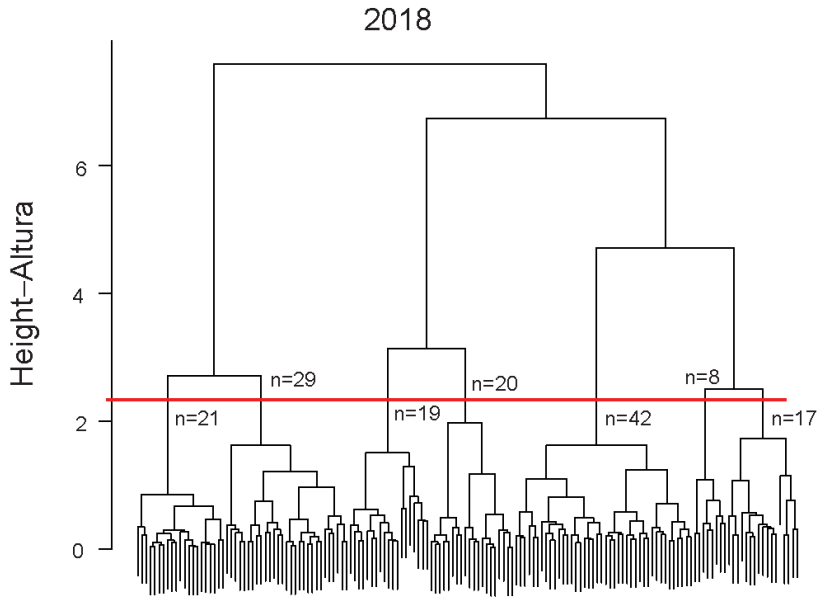
1. **Clustering methods** were used to identify homogeneous groups of vessels (**fleet segments**) for 2018, to provide insights into very recent fishing behavior.

2. The **relationship between the number of active FADs and numbers of OBJ sets per vessel** was evaluated for the **fleet segment** that focused on fishing on **its own FADs** in 2018.

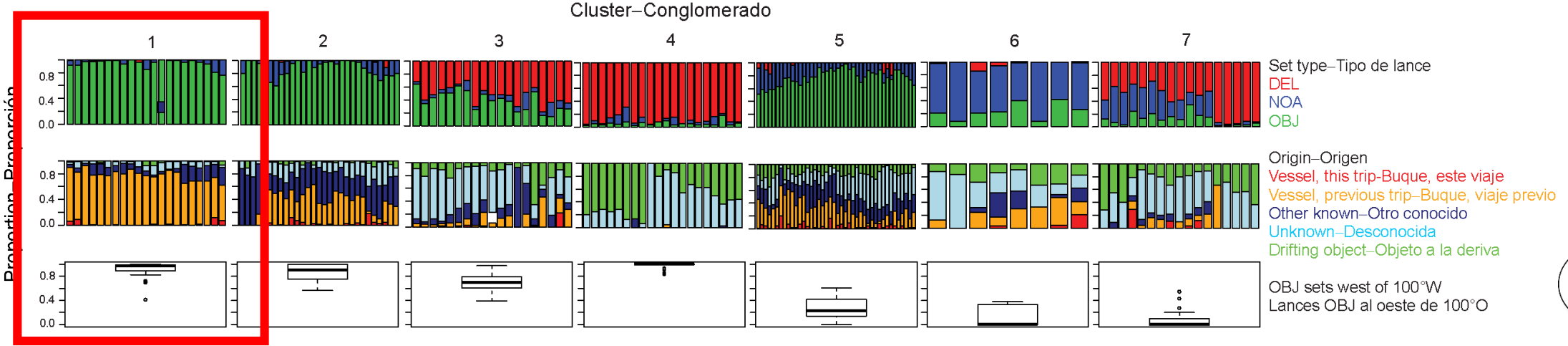
3. **New active FAD limits** were estimated that would **achieve the desired 13% reduction** in OBJ sets (13% is the increase of 2018 OBJ sets vs 2015-2017 levels)

Methods – Clustering

- Only vessels that conduct 5 OBJ sets considered (details on the methodology Lennert-Cody et al. 2018)



Fleet segment that fishes on its own FADs



Methods – relationship between active FADs and OBJ sets

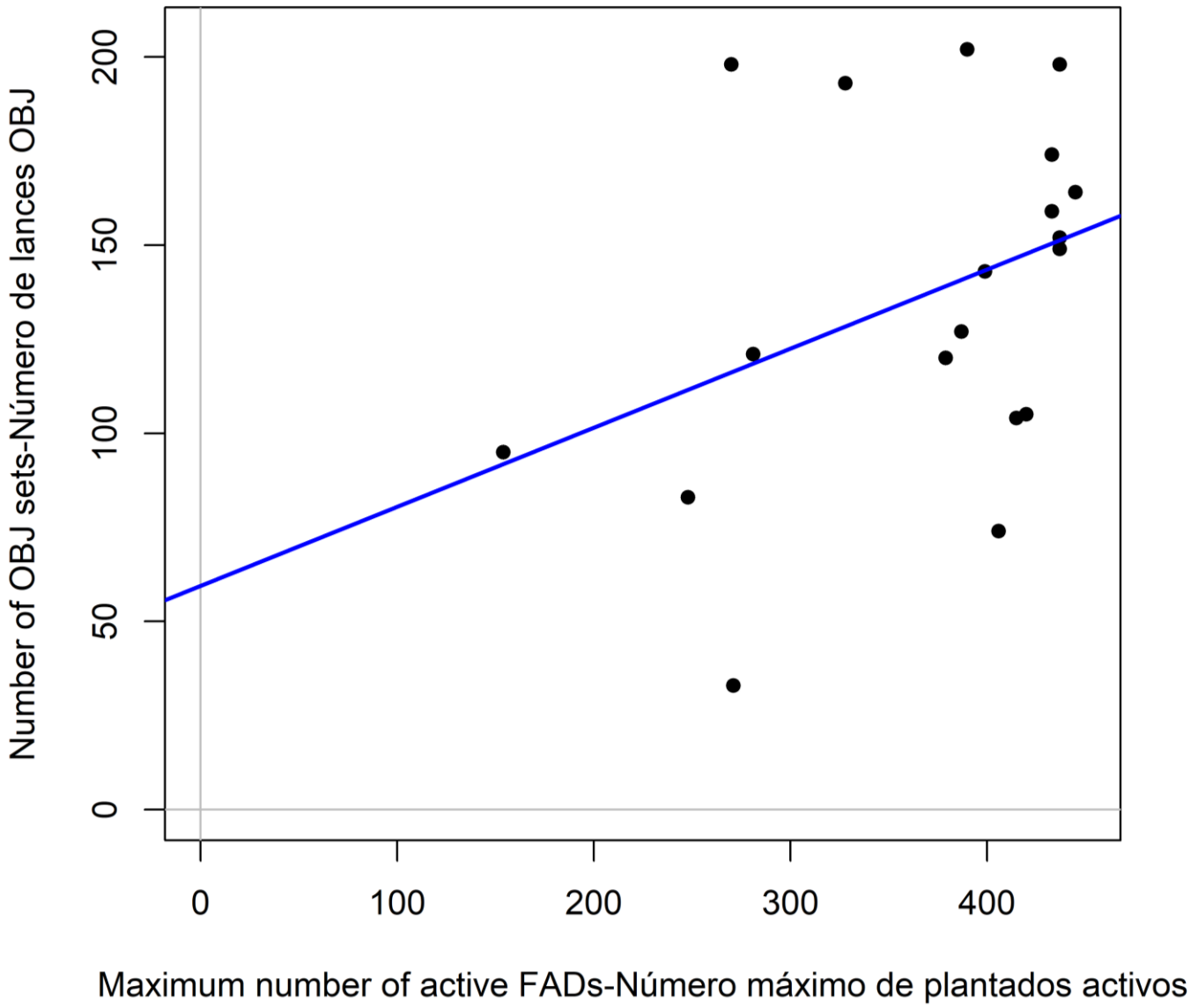
- Number of sets chosen as the best metric because:

(i) it is the metric **most directly related to F**;

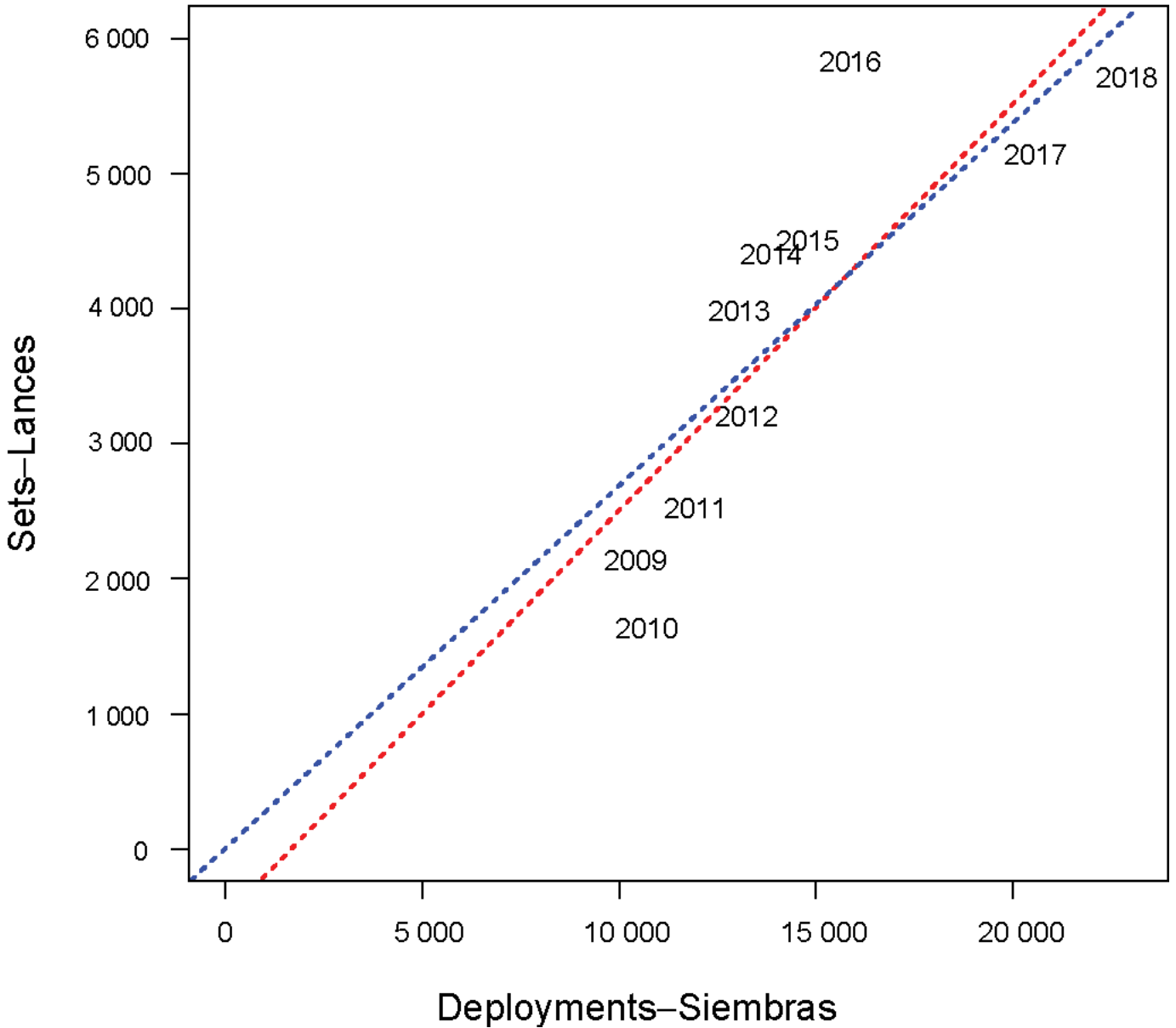
(ii) it is used by the staff to determine **target F levels under a precautionary approach**; and

(iii) there is **no clear evidence that links other metrics to F**, especially in an absence of appropriate measures of effort for the purse-seine fishery (Fonteneau et al. 2013) and data with which to estimate effort (Lopez et al. 2018), which can ultimately lead to **misleading results**.

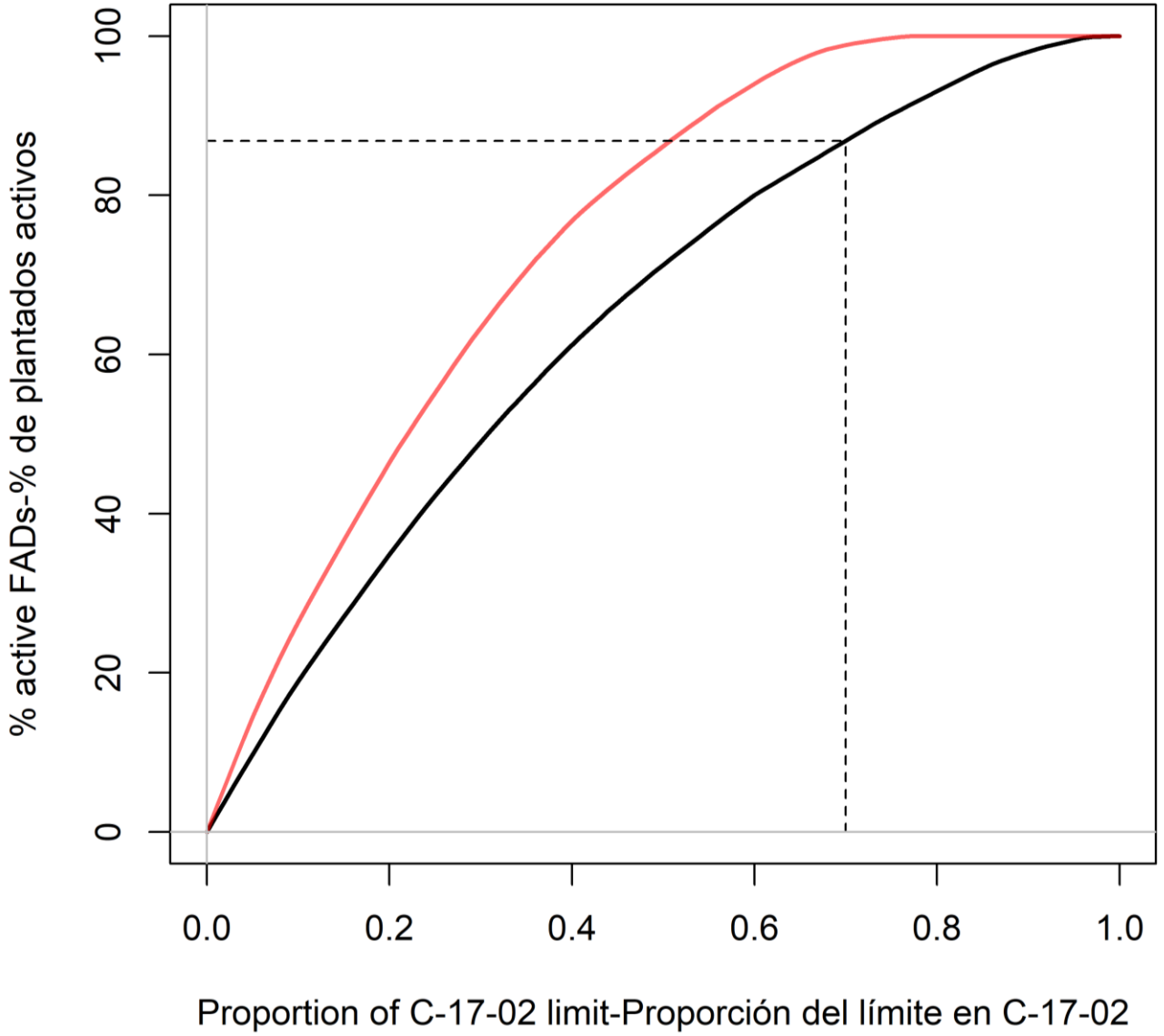
Methods – relationship between active FADs and OBJ sets (2)



Methods – relationship between active FADs and OBJ sets (3)



Methods – estimating the new limits



	Current	New
Class 6 (≥ 1,200 m^3)	450	315
Class 6 (< 1,200 m^3)	300	210
Class 4-5	120	85
Class 1-3	70	50

Methods – estimating the impact

Class	Number of vessels	Limit		Using maximum active FADs		Using average active FADs	
		C-17-02	New	Average FAD reduction (sd)	Affected vessels (%)	Average FAD reduction (sd)	Affected vessels (%)
3	7	70	50	17 (0)	1 (14.3)	0	0
4	28	120	85	14 (2.1)	2 (7.1)	0	0
5	11	120	85	19 (0)	1 (9.1)	0	0
6.a	50	300	210	58 (16.6)	7 (14)	0	0
6.b	56	450	315	91 (44.1)	19 (33.9)	23 (10.7)	4 (7.1)

Conclusions

- An **alternative approach** to meet conservation and management needs was developed by **reducing the current active FAD limits**, which directly relates to sets on FADs.

- **Ideally, these new limits should be used in combination with the limits on the number of OBJ and NOA sets combined**, because skipjack is also a conservation concern and is caught in unassociated sets.

- **Current limits** were both **arbitrary**, with no scientific basis, **and very likely too high**.

- The limits should be **revised to meet specific management needs**. Here, we connect the staff's management recommendation with a **30% reduction of current active FAD limits** , with the intention that a reduction in the number of FADs at sea will help to prevent further increases in fishing mortality.

Conclusions (2)

- Understanding the link between fishing mortality and alternative metrics for the purse-seine fishery is particularly difficult, since the data are not ideal.
- This approach provides a reasonable understanding of the **relationship between number of sets and monitored active FADs**, and can be used to improve scientific advice.
- Nonetheless, the relationship between **mortality and operational characteristics** needs to be better understood if **additional or improved conservation and management measures** are to be developed.
- Very few vessels are reporting daily positions for active FADs, and the **summarized data** reported by the vast majority of the fleet **are of limited use** for scientific studies.
- Therefore, the staff reiterates the need for access to **high-resolution buoy data**.

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Questions