

## AN ASSESSMENT OF FAD MANAGEMENT OPTIONS FOR THE ICCAT CONVENTION AREA

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### SUMMARY

*At the Fad WG's second meeting, urgent action is required to address the unsustainable take of juvenile bigeye in FAD-associated purse seine fishing in the ICCAT Convention Area. FAD management measures can be generally divided into three categories: 1) those that do not reduce juvenile tuna mortality; 2) those that may indirectly reduce mortality; and 3) those that directly reduce mortality. The first category includes the use of non-entangling or biodegradable FADs, limits to the number of FADs monitored by vessels, and alterations to purse seine netting or deployment techniques. The second category includes the implementation of FAD time-area closures, if such a closure is large enough and long enough to demonstrably reduce FAD fishing. The third category includes limits to the number of FAD-associated purse seine sets and limits on juvenile catch. These direct management options would improve both the health of the stock and the productivity of the fisheries. They have the added benefit of allowing the industry to determine how best to implement the limits (in time and space), as opposed to a pre-determined time-area closure.*

### RÉSUMÉ

*À la deuxième réunion du groupe de travail sur les DCP, des actions sont requises de toute urgence pour résoudre les prises insoutenables des juvéniles de thon obèse réalisées dans les pêcheries de senneurs associées aux DCP dans la zone de la Convention de l'ICCAT. Les mesures de gestion des DCP peuvent généralement être divisées en trois catégories : 1) celles qui ne réduisent pas la mortalité des thons juvéniles ; 2) celles qui pourraient indirectement réduire la mortalité et 3) celles qui réduisent directement la mortalité. La première catégorie comprend l'utilisation des DCP non emmêlants ou biodégradables, des limites du nombre de DCP surveillés par navire, ainsi que des modifications des filets de senne ou des techniques de déploiement de la senne. La seconde catégorie comprend la mise en œuvre des fermetures spatio-temporelles pour les DCP, si cette fermeture est assez vaste et suffisamment longue dans le temps pour réduire de façon manifeste la pêche sous DCP. La troisième catégorie comprend des limites du nombre d'opérations à la senne associées à des DCP et des limites des captures de juvéniles. Ces options de gestion directe amélioreraient aussi bien la santé du stock que la productivité des pêcheries. Elles présentent l'avantage supplémentaire de permettre à l'industrie de déterminer la meilleure façon de mettre en œuvre les limites (dans le temps et dans l'espace), par opposition à une fermeture spatio-temporelle prédéterminée.*

### RESUMEN

*En la segunda reunión del Grupo de trabajo sobre DCP se requirieron acciones urgentes para abordar la captura insostenible de juveniles de patudo en la pesca de cerco asociada con DCP en la zona del Convenio ICCAT. Las medidas de ordenación relacionadas con los DCP pueden dividirse, de forma general, en tres categorías. 1) las que no reducen la mortalidad de juveniles; 2) las que podrían reducir indirectamente la mortalidad, y 3) las que reducen directamente la mortalidad. La primera categoría incluye el uso de DCP no enmallantes o biodegradables, limita el número de DCP que son seguidos por los buques e incluye modificaciones en las redes de los cerqueros o en sus técnicas de calado. La segunda categoría incluye la implementación de vedas espaciotemporales a la pesca con DCP, si dicha veda es lo suficientemente amplia y duradera como para reducir de un modo demostrable la pesca con DCP. La tercera categoría incluye la limitación del número de lances de cerco asociados con DCP y limita la captura de juveniles. Estas opciones de ordenación directa mejorarían tanto el estado del stock como la productividad de las pesquerías. Además, cuentan con el valor añadido de permitir que la industria determine la mejor forma de*

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*implementar los límites (en el tiempo y en el espacio), frente a una veda espacio-temporal predeterminada.*

#### KEYWORDS

*Fish aggregating devices, Atlantic bigeye tuna, FAD-associated purse seine fishing, FAD set limits*

## Introduction

In 2014, ICCAT adopted a Recommendation to establish an Ad Hoc Working Group on FADs (ICCAT Rec. 14-03), in order to begin addressing the growing reliance on FADs in the ICCAT Convention Area and mitigate any negative consequences of increasing FAD use. The Group held its first meeting in May 2015, where stakeholders shared information on FAD fishing, FAD design, and voluntary FAD restrictions. The Commission renewed the WG's mandate in 2015 (ICCAT Rec. 15-02). As the FAD WG convenes for its 2<sup>nd</sup> meeting, it is both important and timely that the WG recommend ways ICCAT could directly control and reduce the mortality of juvenile bigeye tuna in the FAD-associated purse seine fishery. This brief document assesses a range of possible management options to be considered by the FAD WG.

## Background on FAD fishing for Atlantic tunas

The use of FADs to catch tropical tunas has become widespread in all oceans, and the unmanaged proliferation of this gear is a global challenge to sustainable tuna fisheries. In the ICCAT Convention Area, FAD use has grown rapidly in the last decade, with increases compounded by the migration of FAD-fishing fleets from the western Indian Ocean. A conservative estimate of the number of FADs now deployed in the ICCAT Convention Area is approaching 20,000 per year (Gershman et al. 2015). In the western and central Pacific Ocean, dynamics similar to those in ICCAT have contributed to driving Pacific bigeye into an overfished condition. The growth of the FAD-associated purse seine fishery in the WCPO, coupled with a lack of management that would directly control bigeye mortality in the FAD fishery, has helped deplete Pacific bigeye to levels below those capable of producing maximum sustainable yield and below the WCPFC's bigeye limit reference point. To address the situation in the WCPO, the WCPFC has also established a FAD Working Group. IOTC and IATTC have also recently agreed to develop FAD Working Groups. The proliferation of FADs and FAD-associated purse seine fishing is a global trend. Thus, all four major tuna RFMOs now have FAD WGs intended to address the need for more holistic understanding of FAD impacts on target and non-target species and to inform the development of regulatory measures intended to manage FAD use.

Both purse seine and bait boat operations exploit the tendency of tropical tunas to aggregate around floating objects. Purse seiners targeting skipjack tuna, in particular, deploy satellite-tracked, instrument-laden, artificial FADs, and as much as 90% of the purse seine skipjack catch in the Convention Area has been made in association with FADs in recent years. There are, however, environmental and economic costs associated with FAD fishing, largely as a result of capturing non-target species and age classes. In the Atlantic Ocean, juvenile yellowfin and bigeye tunas aggregate around FADs and are taken by FAD-fishing operations targeting skipjack. Purse seine catches of bigeye, in particular, have increased rapidly in recent years in tandem with increasing FAD use. According to the SCRS, total tonnage of juvenile bigeye landed by purse seiners is approaching the tonnage of adult bigeye landed by longliners, and the total number of landed individuals is overwhelmingly dominated by purse seiners. The average size of a bigeye landed by a purse seiner is less than two kilos. This change in selectivity of Atlantic tropical tuna fisheries has negative consequences for both the stocks and the fisheries that target them.

In 2015, the SCRS conducted a stock assessment for bigeye tuna and determined that it is both overfished and experiencing overfishing. The growing take of juvenile bigeye associated with FADs is a primary driver of this decline in the stock and threatens bigeye fisheries by decreasing the maximum sustainable yield and increasing the adult biomass required to produce maximum sustainable yield. In its 2015 management advice, the SCRS clearly stated that "should the Commission wish to increase long-term sustainable yield, the [SCRS] continues to recommend that effective measures be found to reduce FAD-related and other fishing mortality of small bigeye tunas." A reduction in juvenile mortality would directly contribute to the recovery of this stock.

In addition to the poor status of the Atlantic bigeye stock, the Atlantic yellowfin stock is overfished, and the free school skipjack fishery has seen recent negative trends, both at least partially the result of an exploding number of FAD-associated purse seine sets in the eastern Atlantic (ICCAT 2015; Fonteneau 2015).

Charged with delivering sustainable management of the tuna fisheries in the Atlantic Ocean, ICCAT must take steps to address the growing reliance on FADs by purse seine operations. The Ad Hoc Working Group on FADs is the mandated body to review management options and make management recommendations to the full Commission at the 2016 annual meeting.

### **Reviewing FAD Management Options**

FAD management measures can be generally divided into three categories: 1) those that do not reduce juvenile mortality; 2) those that could indirectly reduce juvenile mortality; and 3) those that directly reduce juvenile mortality. Each of these options is discussed in greater detail, below.

#### ***FAD management options that do not reduce juvenile mortality***

Recent efforts to manage FADs at ICCAT include requiring FADs to be both non-entangling and biodegradable and capping the number of FADs that any vessel can monitor at one time at 500. Although these efforts may realize some secondary management purposes, they do not support ICCAT in its fundamental mission of preventing overfishing and preventing targeted stocks from becoming overfished. Both non-entangling and biodegradable FADs are now required for use in the ICCAT Convention Area (ICCAT Rec. 15-01). Non-entangling FADs are designed to prevent non-tuna bycatch (e.g., of sharks and turtles), but there is no evidence that this type of FAD design affects aggregating juvenile bigeye or reduces bigeye mortality. Biodegradable FADs are intended to prevent the tens of thousands of FADs deployed and abandoned each year from becoming permanent fixtures in the open ocean, contributing to growing marine debris and ghost fishing problems. However, their use does not ultimately result in reduced juvenile bigeye or yellowfin mortality.

Efforts to limit the number of FADs deployed by each purse seine vessel would assist in addressing marine debris concerns and ghost fishing problems. However, to date there is no scientific evidence that the number of FADs deployed correlates with juvenile bigeye mortality as mortality tracks with setting purse seine nets around FADs, not simply deploying them. Thus, the soon to be implemented limit of 500 FADs that can be *monitored* at any given time, per vessel, in the ICCAT Convention Area (ICCAT Rec. 15-01) does not limit FAD-fishing effort itself and is unlikely to result in reductions in juvenile bigeye catches. Large purse seine vessels rarely set on more than one FAD per day, so this number does not represent a real limit to their activities. Furthermore, there is no deployment cap in the Atlantic Ocean, so the number of FADs in the water is essentially unlimited.

Finally, species discrimination efforts, spearheaded by the fishing industry, with the goal of using sonar-equipped buoys to distinguish between skipjack and bigeye, do not provide the necessary incentive to reduce catch of juvenile bigeye. While technology has advanced significantly in recent years, more development is required to allow fishermen to identify bigeye with reliability and precision (Fuller and Schaefer 2014; Lopez et al. 2014). Additionally, the ability to distinguish between species must be coupled with other policies and /or incentives that reduce mortality. Currently, such policies do not exist at ICCAT, and there is no economic incentive to avoid bigeye, as canneries pay fishing operations the same amount for both species (Restrepo et al. 2014).

#### ***FAD management options that could indirectly reduce juvenile mortality***

Time-area closures have been attempted as a means to reduce overfishing associated with FAD fishing in both the Atlantic and Pacific oceans. These closures limit or ban FAD-associated purse seine sets in a specific area, for a specific amount of time and are intended to indirectly reduce the amount of juvenile bigeye taken in association with FADs. To date, time-area FAD closures have not been effective in managing juvenile bigeye mortality anywhere in the world where they have been attempted. FAD closures are limited, both temporally and spatially, so FAD fishing operations are restricted only in their time-area distribution rather than their total effort. FAD fishing can continue to occur during the closure outside of the area and can continue to occur in the area during the rest of the year. Purse seiners are becoming more efficient and can fish with greater intensity during the non-closure, while deploying larger numbers of FADs. Furthermore, without a requirement to remove FADs from the water during a closure, they continue to aggregate tunas, potentially increasing the yield per set at the end of the closed season. Several time-area closures have been attempted in the ICCAT Convention

Area, but none has been successful at reducing juvenile bigeye or yellowfin mortality. A new, large closure was adopted in 2015 (ICCAT Rec. 15-01), but it has not yet been implemented. Currently, there is no scientific advice on how this new closure will reduce bigeye overfishing or promote recovery of the stock.

Alterations to purse seine nets or deployment strategies have also not been shown to reduce juvenile bigeye mortality. Neither escape panels nor deployment of shallower nets have been successful at reducing bigeye catch. Complex interactions among small-scale environmental characteristics and seasonal cues influence tuna behavior, making it difficult for fishermen to predict how their fishing methods and gear depths will affect the ratio of skipjack to bigeye in each purse seine set (Lennert-Cody et al. 2007).

### ***FAD management options that directly reduce juvenile mortality***

The goal of FAD management should be to reduce the overfishing of bigeye and to recover the depleted bigeye and yellowfin stocks to levels that support maximum sustainable yield. The only effective way to accomplish this goal is through implementation of management options that directly and demonstrably reduce juvenile mortality. A limit on juvenile mortality can be achieved in two direct ways: 1) reducing and capping the number of FAD-associated purse seine sets or 2) implementing a purse seine bigeye catch limit. These are the only options that will meaningfully contribute to ending overfishing, improving the health of the stock and the productivity of the fishery. In addition these options allow the industry to determine how best to plan and execute their FAD use throughout the year, as opposed to a pre-determined time-area closure.

In the western and central Pacific Ocean, studies have already demonstrated that a reduction in FAD-associated sets would positively affect the bigeye stock there (Sibert et al. 2011; Satoh et al. 2012; Japan 2013). A FAD-associated set limit gives the fishing industry the flexibility to choose when and where to fish, as opposed to a time-area closure that prescribes how the industry should operate. This option has the added advantage of being relatively easy to implement, as purse seine vessels are already required to report their interactions with FADs (including sets), and observers can verify the number of FAD sets during each fishing trip.

Implementing a purse seine bigeye catch limit also allows managers to directly tie management to the scientific advice, as opposed to trying to implement the advice indirectly. Juvenile catch limits encourage industry to catch fewer bigeye per purse seine set, incentivizing the use of technological innovation or oceanographic information to avoid setting on FADs with large numbers of bigeye. This option also does not directly limit the use of FADs, as long as the total amount of bigeye landed does not breach the limit.

Prior concerns surrounding purse seine bigeye catch limits have focused on the feasibility of obtaining bigeye catch estimates from the purse seine fishery with sufficient accuracy and timeliness to assess compliance with the catch limit. However, 100% coverage on purse seine vessels in the ICCAT Convention Area will be implemented in the latter half of 2016 (ICCAT Rec. 15-01), and observers could be trained to obtain bigeye landings through regular sampling. Additionally, while juvenile catch limits will require specific scientific advice on the ratio of longline (adult) to purse seine (juvenile) mortality as drivers of overfishing to determine where the juvenile quota should be set, this advice could be generated during stock assessments. Most importantly, purse seine catch limits must be set low enough to demonstrably improve the stock structure of tropical tunas and support the recovery of overfished stocks.

### **Conclusions**

The FAD WG will formally report back to the Commission in fall 2016. It is vital that the WG use its second meeting to develop a comprehensive set of policy recommendations that clearly address the impacts of FAD-associated purse seine fishing and reduce the resulting high level of juvenile tuna mortality. Most of the FAD management options that have already been implemented at ICCAT are designed to address other issues: marine debris, ghost fishing, non-tuna bycatch, etc., but they do not improve management of tropical tunas. Given concerns regarding the stock status resulting from the poor results of the latest bigeye stock assessment, it is imperative that the FAD WG recommend FAD management options that directly tackle the overfishing of bigeye and recover the bigeye and yellowfin stocks to levels capable of producing maximum sustainable yield. These efforts will have the added benefit of supporting more lucrative fisheries and higher yields of these two ecologically and economically important tropical tunas. The success of the FAD WG depends on the willingness of participants to make recommendations that support ICCAT's fundamental mission to sustainably manage tuna fisheries in the Atlantic Ocean. FAD-associated purse seine set limits and purse seine catch limits are the only two management options that have been demonstrated to contribute to achieving this mission.

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