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**INDIVIDUAL-VESSEL QUOTAS FOR PURSE-SEINE VESSELS THAT
FISH ON FISH-AGGREGATING DEVICES (FADs)**

A system of individual-vessel quotas (IVQs) to limit catches of juvenile bigeye, particularly in the purse-seine fishery on fish-aggregating devices (FADs), has been proposed as an alternative to the current system of closures of the purse-seine fishery in the eastern Pacific Ocean. At the request of some Commissioners, the staff carried out four analyses of IVQ limits on the total catch (retained catch plus discards) of bigeye and yellowfin by purse-seine vessels, in order to determine the size of the quotas that would be equivalent to a closure in terms of limiting catches. The data and analysis are restricted to floating-object sets only.

On the basis of observer estimates of total catches of these two species, 100 class-6¹ purse-seine vessels were identified whose annual catches of bigeye in sets on floating objects during 2009-2011 averaged at least 50 metric tons (t). During that period, observer estimates of the annual total catches by these vessels in such sets averaged 50,656 t and 29,611 t of bigeye and yellowfin tuna, respectively. Yellowfin was included in the IVQ analysis for several reasons, including: (1) distinguishing small yellowfin from bigeye can be difficult at sea; (2) conservation of yellowfin of the small sizes generally caught in floating-object sets is an appropriate management goal. The analyses were carried out for bigeye catches only and also for the combined catch of bigeye and yellowfin by the same group of 100 vessels.

The objective of the analyses is to produce a series of options using IVQs to achieve the same conservation effect as closures of the purse-seine fishery. IVQs were calculated by multiplying the vessel's capacity by the IVQ rate, a calculated quantity designed to make the projected total catch by the fleet equal to the target catch for achieving the desired conservation goal. This formula combines a vessel's performance (expressed as the product of observed catch per day's fishing and allowable days of fishing) and IVQ (expressed as the product of the IVQ rate and the vessel's carrying capacity). Because catch limits can vary from year to year, the actual tonnage of a vessel's IVQ can also vary, but its proportion of the total catch relative to other vessels will remain the same. For a given number of days of closure, the projected catch is the lesser of (a) the vessel's IVQ or (b) its total estimated catch of bigeye and yellowfin combined during the allowable days of fishing. Actual vessel performance is taken into account by the use of that formula in the analysis.

The results, based on the actual performance of the 100 vessels during 2009-2011, are shown in Figures 1a and 1b for bigeye and yellowfin combined and for bigeye, respectively. As expected, the size of the IVQ varies inversely with the length of the closure period. Figures 2a and 2b show the IVQ as a function of vessel capacity, for the single case of no closure. By design, the IVQ increases proportionally to vessel capacity. If it were instead assumed that all vessels would catch the maximum amount of bigeye permitted, then the IVQ is reduced substantially: for example, with no area closure the IVQ rates are reduced from 0.86 t/m³ to 0.59 t/m³ for bigeye and yellowfin combined, and from 0.59 t/m³ to 0.38 t/m³ for bigeye only.

¹ Carrying capacity greater than 363 metric tons (425 cubic meters of well volume)

In theory, IVQs can provide a mechanism by which the days of permitted fishing by purse seiners can be extended, even to cover the entire year. However, there are several practical difficulties with IVQs, including:

1. Determining when a vessel has reached its IVQ can be problematic. The determination would necessarily be based on estimates of the vessel's year-to-date catch of bigeye (or bigeye and yellowfin combined); thus, both the quantity and the species composition of the catches have to be determined. The only real-time estimates are those made by the observer aboard the vessel, but the observer relies on advice from the vessel's personnel in making catch estimates, and in any case, he does not have the authority to oblige the vessel to stop fishing. If the determination is made after the catch is unloaded in port, usually the only estimate available is that made by the cannery that receives the catch. If the vessel has been sampled by IATTC staff during unloading, that estimate will also be available, but the port sampling program covers only a small percentage of the total catch.
2. The consequences of exceeding an IVQ also need to be determined. A vessel could be allowed to buy other vessels' residual IVQ, or could be penalized in a subsequent year, by the reduction of its IVQ or by some other means. It could be allowed to continue fishing during that year, but be restricted to setting on unassociated tunas only. It could also be required to remove its FADs from the water.

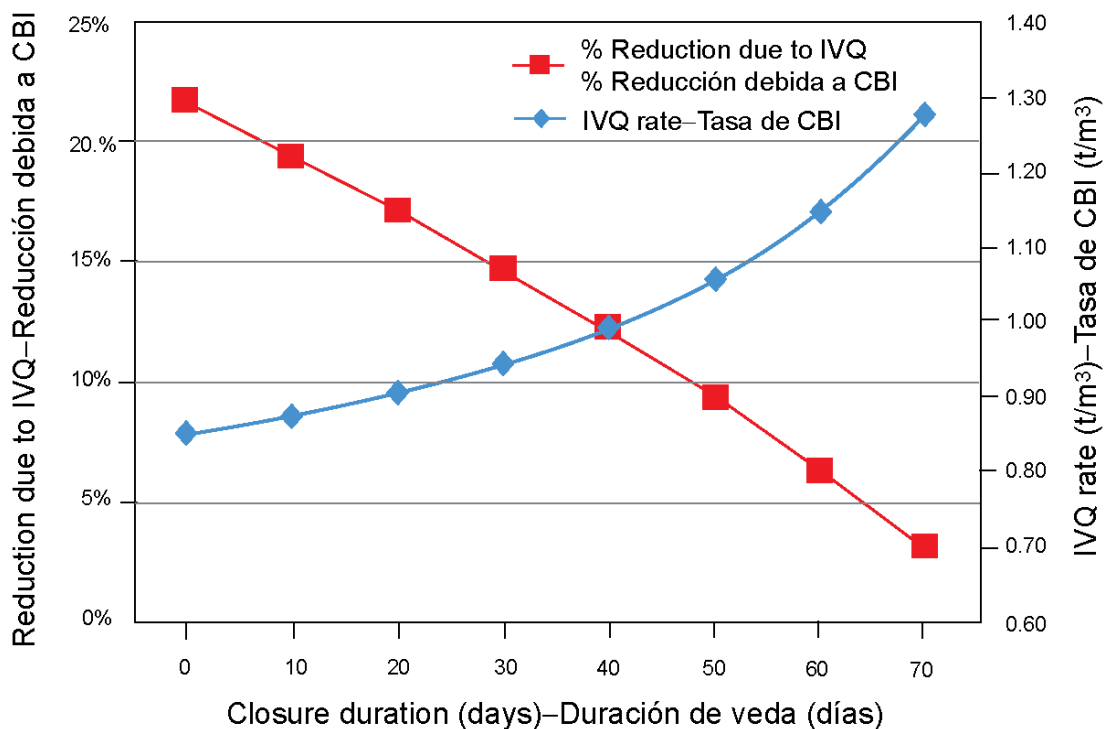


FIGURE 1a. IVQ rates for bigeye and yellowfin tunas combined corresponding to various closure durations, and reduction in total catch due to IVQ.

FIGURA 1a. Tasas de CBI de atunes patudo y aleta amarilla combinados correspondientes a varias duraciones de veda, y reducción de la captura debida a la CBI.

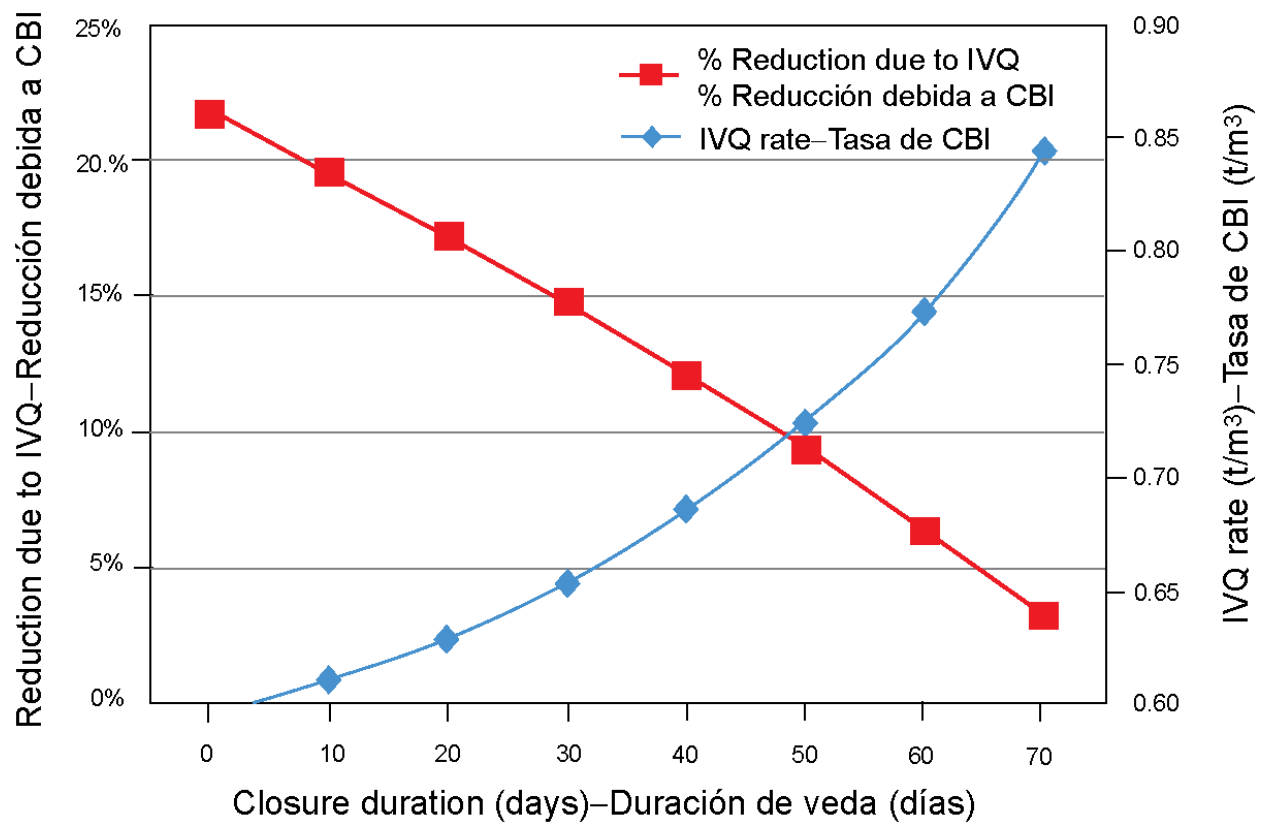
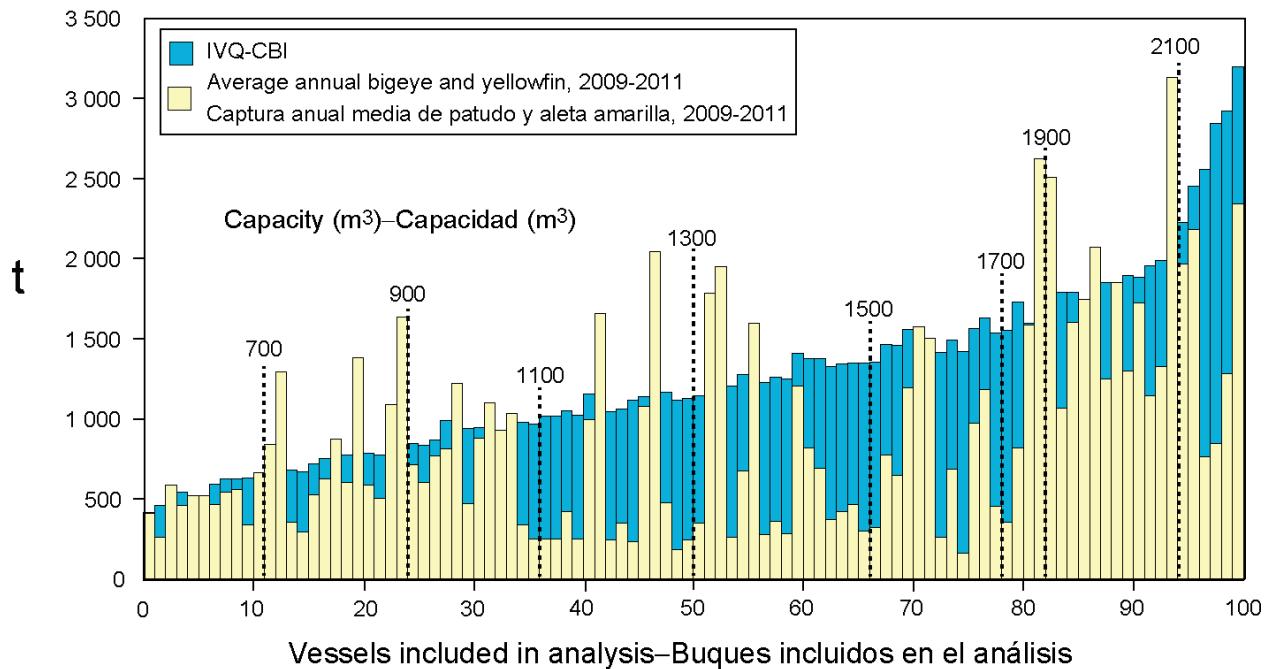


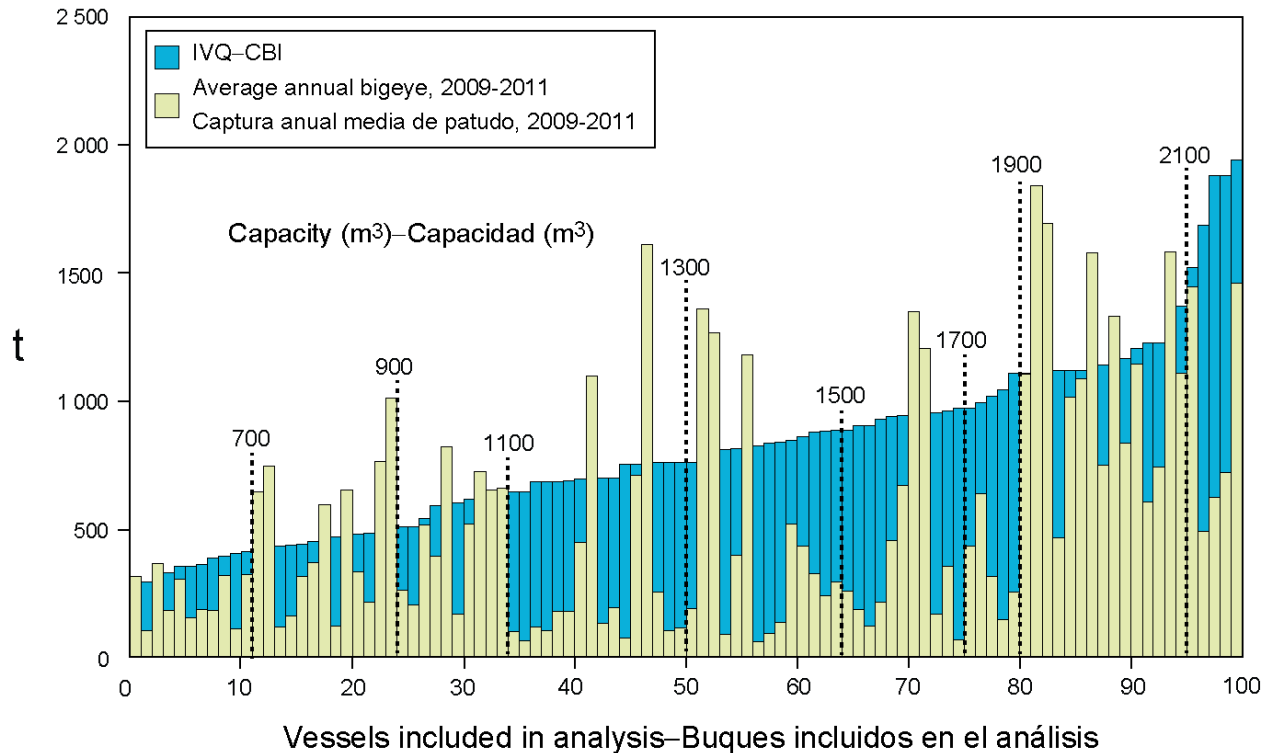
FIGURE 1b. IVQ rates for bigeye corresponding to various closure durations, and reduction in total catch due to IVQ.

FIGURA 1b. Tasas de CBI de patudo correspondientes a varias duraciones de veda, y reducción de la captura total debida a la CBI.



Vessels included in analysis–Buques incluidos en el análisis

FIGURE 2a. Average annual catches (retained plus discards) of bigeye and yellowfin tunas combined, in metric tons (t), 2009-2011, by the 100 vessels included in the analysis (see text), and calculated IVQs.
FIGURA 2a. Capturas (retenidas más descartes) anuales medias de atunes patudo y aleta amarilla combinados, en toneladas (t), 2009-2011, por los 100 buques incluidos en el análisis (ver texto), y CBI calculadas.



Vessels included in analysis–Buques incluidos en el análisis

FIGURE 2b. Average annual catches (retained plus discards) of bigeye tuna, in metric tons (t), 2009-2011, by the 100 vessels included in the analysis (see text), and calculated IVQs.
FIGURA 2b. Capturas (retenidas más descartes) anuales medias de atún patudo, en toneladas (t), 2009-2011, por los 100 buques incluidos en el análisis (ver texto), y CBI calculadas.