Comisión Interamericana del Atún Tropical
Inter-American Tropical Tuna Commission

CIAT
IATTC

Expectations and results from the proposed IATTC RTTP during 2019-2020 useful for improving stock assessments, particularly for skipjack tuna

Workshop on age and growth of bigeye and yellowfin tunas in the Pacific Ocean, La Jolla, CA, Jan 23-25, 2019

Outline

- Why tagging data is needed
- What tagging data can be used for
- What are some of the issues

Skipjack status

- The average weight of skipjack has generally been declining since 2000
- Catch and catch per day fished have been increasing
- The number of purse seine sets on floating objects has been increasing
- The catch per set has been decreasing

Skipjack indicators

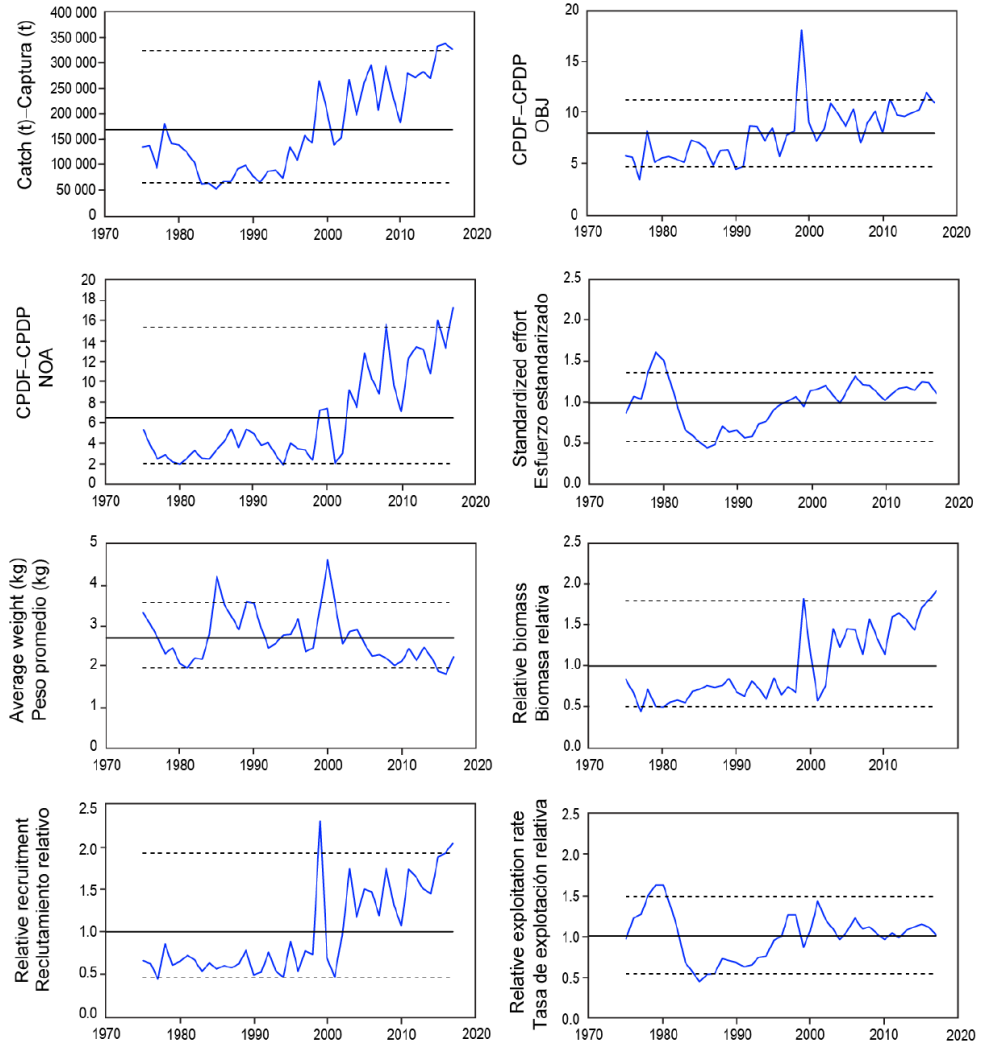

FIGURE 1. Indicators of stock status for skipjack tuna in the eastern Pacific Ocean. OBJ: floating-object fishery; NOA: unassociated fishery; CPDF: catch per day fished. All indicators are scaled so that their average equals one.

Skipjack indicators

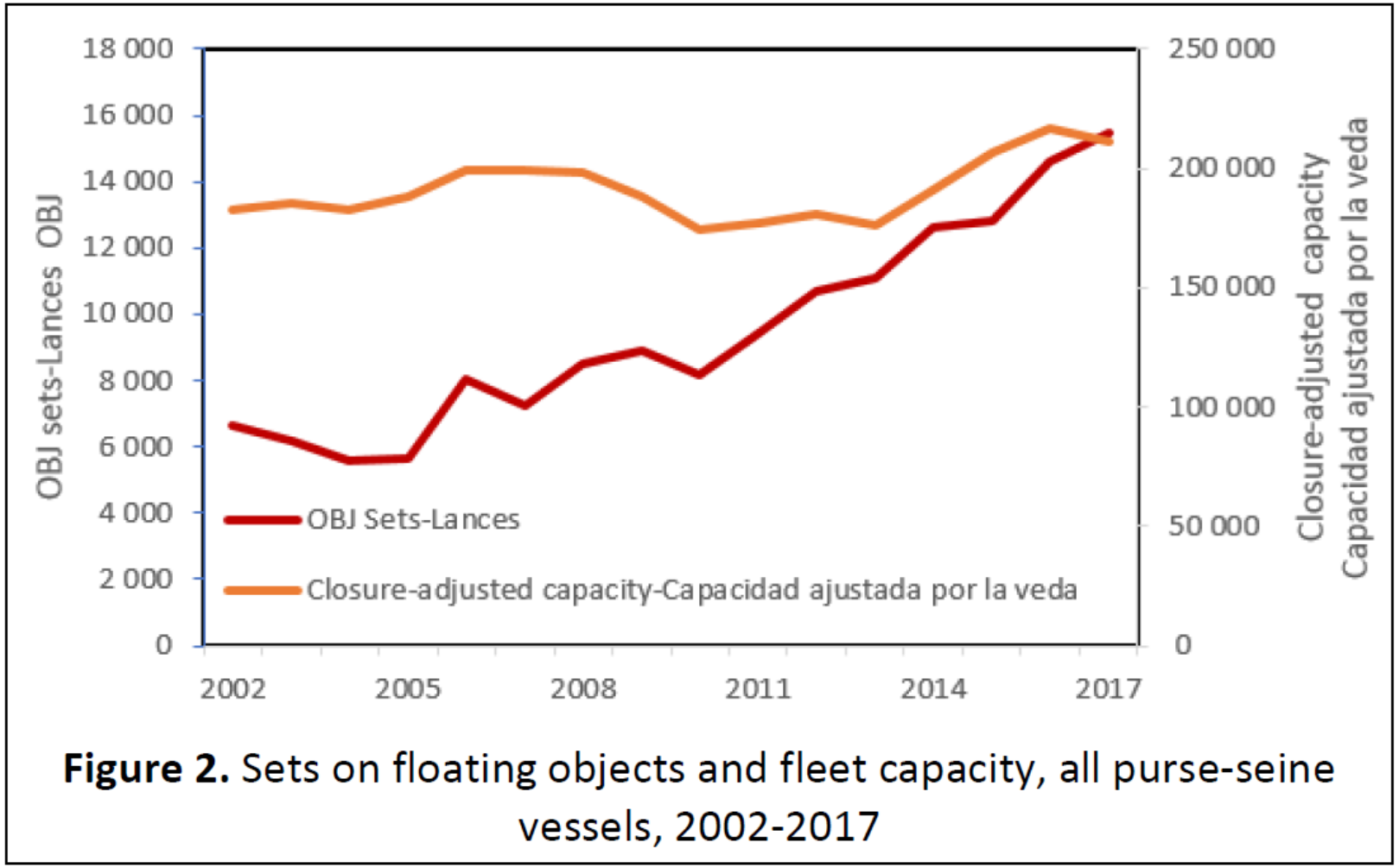

Figure 2. Sets on floating objects and fleet capacity, all purse-seine vessels, 2002-2017

Skipjack assessments

- Previous assessments using a catch-at-length analysis (A-SCALA) to assess skipjack tuna in the EPO were considered preliminary because:
- 1) it was unknown if catch-per-day-fished for purse-seine fisheries is proportional to abundance;
- 2) it is possible that there is a population of large skipjack that is invulnerable to the fisheries; and
- 3) the structure of the EPO stock in relation to the western and central Pacific stocks is uncertain.

Skipjack assessments

- ASCALA integrated stock assessment model
- Fishery and biological indicators
- Analysis of tag data
- Length-structured stock assessment model
- Spatial Ecosystem and Population Dynamic Model (SEAPODYM)

Skipjack management

- Previous assessments estimated that maximum yields are achieved with infinite fishing mortality because the critical weight is less than the average weight at recruitment to the fishery.
- However, this is uncertain because of uncertainties in the estimates of natural mortality and growth.
- For this reason, no traditional reference points are available for skipjack tuna in the EPO.

Other tropical tunas (YFT and BET)

- Growth of old individuals uncertain
- Stock structure and movement uncertain
- Natural mortality uncertain

Potentially estimable quantities from tagging data

- Absolute abundance
- F
- M by size
- Growth
- Selectivity
- Stock structure/Movement

Issues

- Mixing
  - Spatial coverage of tagging
- Tag related mortality
  - Initial
  - Long term
- Tag loss
  - Initial
  - Long term
- Reporting rate
- Reporting reliability
  - Date, area, length
- Shrinkage

Easiest

- Total local mortality (Wildlife MR)
  - Adjust using local catch to estimate M and local F
  - Local selectivity

Tagging dynamics model

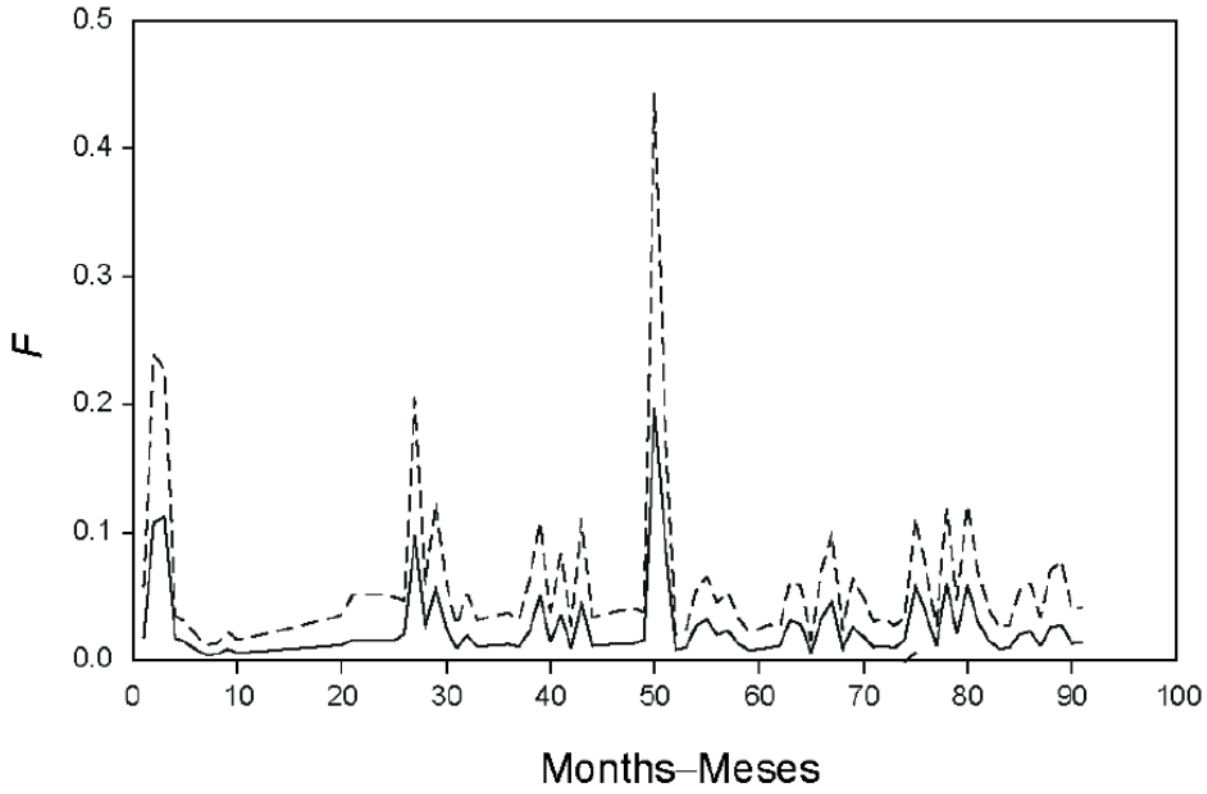

FIGURE 4.1b. Estimates of fishing mortality (F). with 95% confidence intervals, for the historic tag data. Time is in months since April 2000 (month 1).

FIGURA 4.1b. Estimaciones de la mortalidad por pesca (F), con intervalos de confianza de 95%, para los datos de marcado recientes. Tiempo en meses a partir de abril de 2000 (mes 1).

Medium-term

- Spatio-temporal model of tagging data to deal with mixing

Potential long-term

- SKJ control rule based on tag returns
- Integrate into stock assessment model

Thank you!

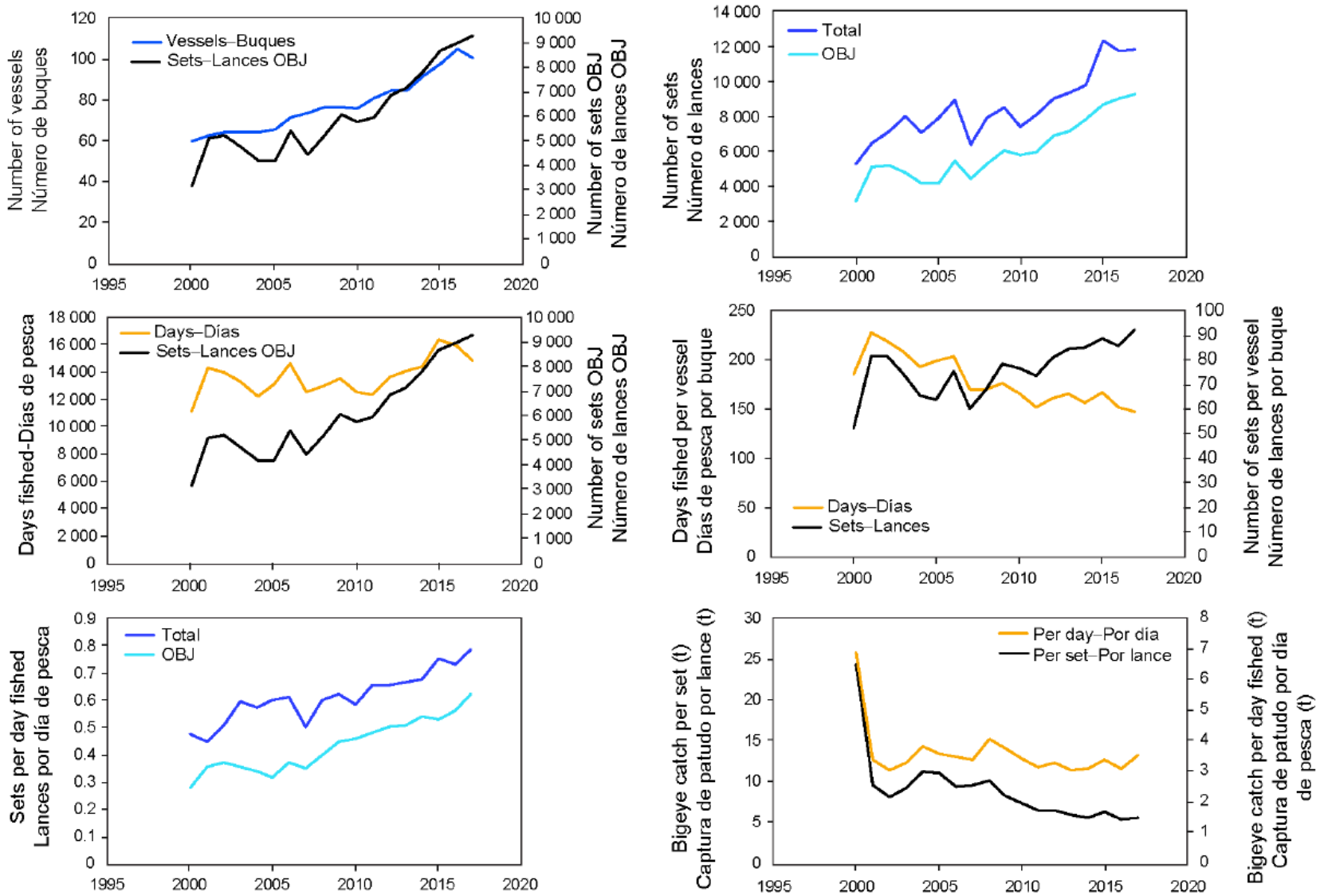

FIGURE 2. Quantities used to investigate the relationship between days fished and the number of floating-object (OBJ) sets, 2000-2017, based on data from purse-seine vessels that made more than 50% of their sets on floating objects.

Skipjack assessment

- ASCALA integrated stock assessment model
  - Can’t estimate absolute abundance
  - No reliable index of relative abundance
  - Possible dome shape selectivity
- Fishery and biological indicators
  - Catch and CPUE both increasing
- Analysis of tag data
- Length-structured stock assessment model
- Spatial Ecosystem and Population Dynamic Model (SEAPODYM)