Preliminary performance evaluation of normal versus shallow non-entangling FADs in the equatorial eastern Pacific tuna purse-seine fishery

A collaborative effort by ISSF, NIRSA, and IATTC

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- Lennert-Cody et al. (2007; 2016) reported that the presence of bigeye in the EPO purse seine catch was more likely with deeper floating objects
- Field experiments to evaluate the performance of normal versus shallow non-entangling FADs in the purse-seine fishery of the equatorial eastern Pacific are being conducted, with an emphasis on the tuna species catch composition, seeking a practical solution to reduce fishing mortality on small undesirable sizes of bigeye

MATERIALS AND METHODS

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- The rafts for 50 normal and 50 shallow depth FADs were similar dimensions (1.3 x 2 m) and construction materials; consisting of dried bamboo canes tied together with nylon twine, covered with Saran black shade cloth, and then wrapped tightly with 30mm sardine netting. 6 net floats were tied beneath each raft under the shade cloth, and plastic bait containers included underneath all FADs before deployments.

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- The sub-surface appendages attached beneath the normal depth FADs were approximately 37 m, and consisted of coils of twisted and tied scrap tuna or sardine netting weighted with chain.

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• The sub-surface appendages attached beneath the shallow depth FADs were approximately 5 m, and consisted of 4 ropes (1.5” dia) attached to a split bamboo frame weighted with chain, and coconut palm fronds laced to the ropes.

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• Marine Instruments (MI) M3i echo-sounder buoys (50 kHz, 50 depth intervals 3m/ea, 5 min sampling frequency) were attached to each of the 100 FADs. Arrangements were made with NIRSA and MI so as to receive the M3i buoy data for all 100 FADs at IATTC utilizing the MI software.


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195903
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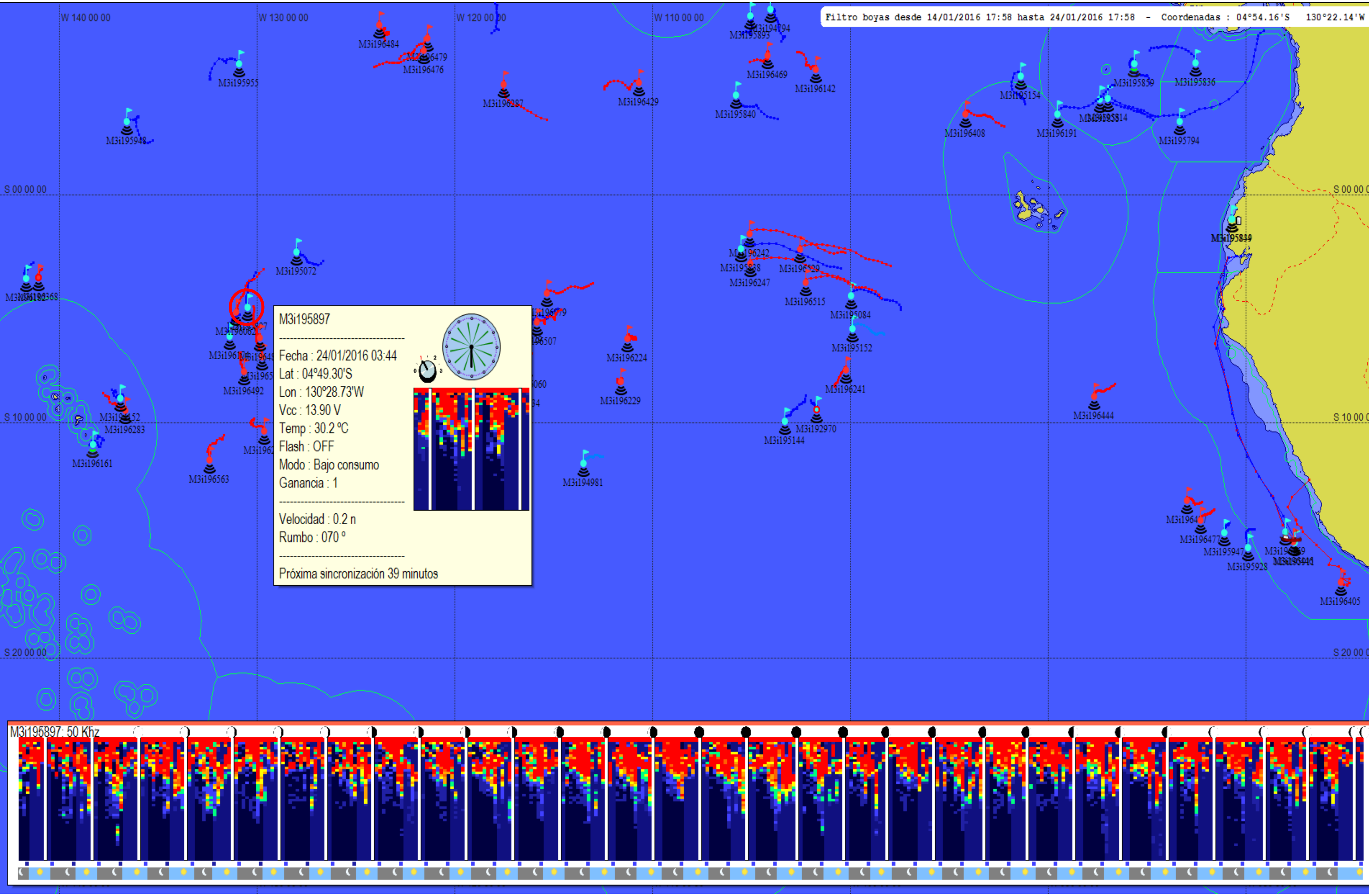
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Lat : 04°49.30'S
Lon : 130°28.73'W
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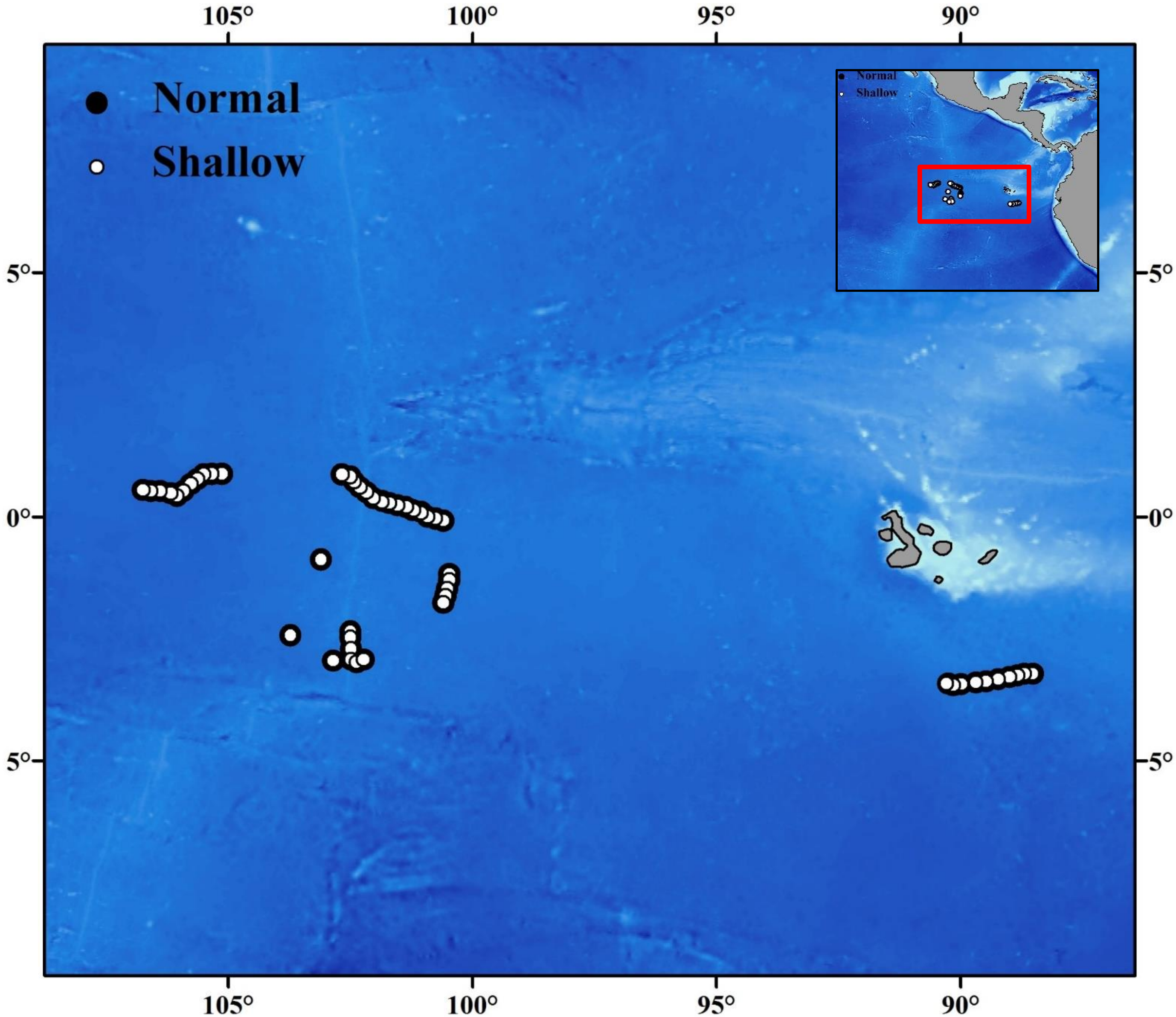
Flash : OFF
Modo : Bajo consumo
Ganancia : 1
Velocidad : 0.2 n
Rumbo : 070 °
Próxima sincronización 39 minutos
M3i195897: 50 Khz

MATERIALS AND METHODS

• The normal and shallow depth FADs were deployed from the FV Milena A simultaneously in pairs along 7 transects between 3°S -1°N and 89°-107°W during 25 June through 20 July, 2015. Each deployment was recorded by the navigator on a data form created at IATTC which included data fields for FAD type, deployment date and position, M3i buoy number and the Milena A number painted on each buoy. In addition, the IATTC observer aboard recorded each of the deployments so as to independently verify the FAD types with the buoy identification numbers.

Deployment locations for 50 normal and 50 shallow depth FADs



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• Fishing activity forms, also created at IATTC for this project, were provided to all 11 NIRSA purse-seine vessels and the navigators were instructed to complete when conducting any activities around the 100 experimental FADs, including setting, checking, recovering and/or relocating.

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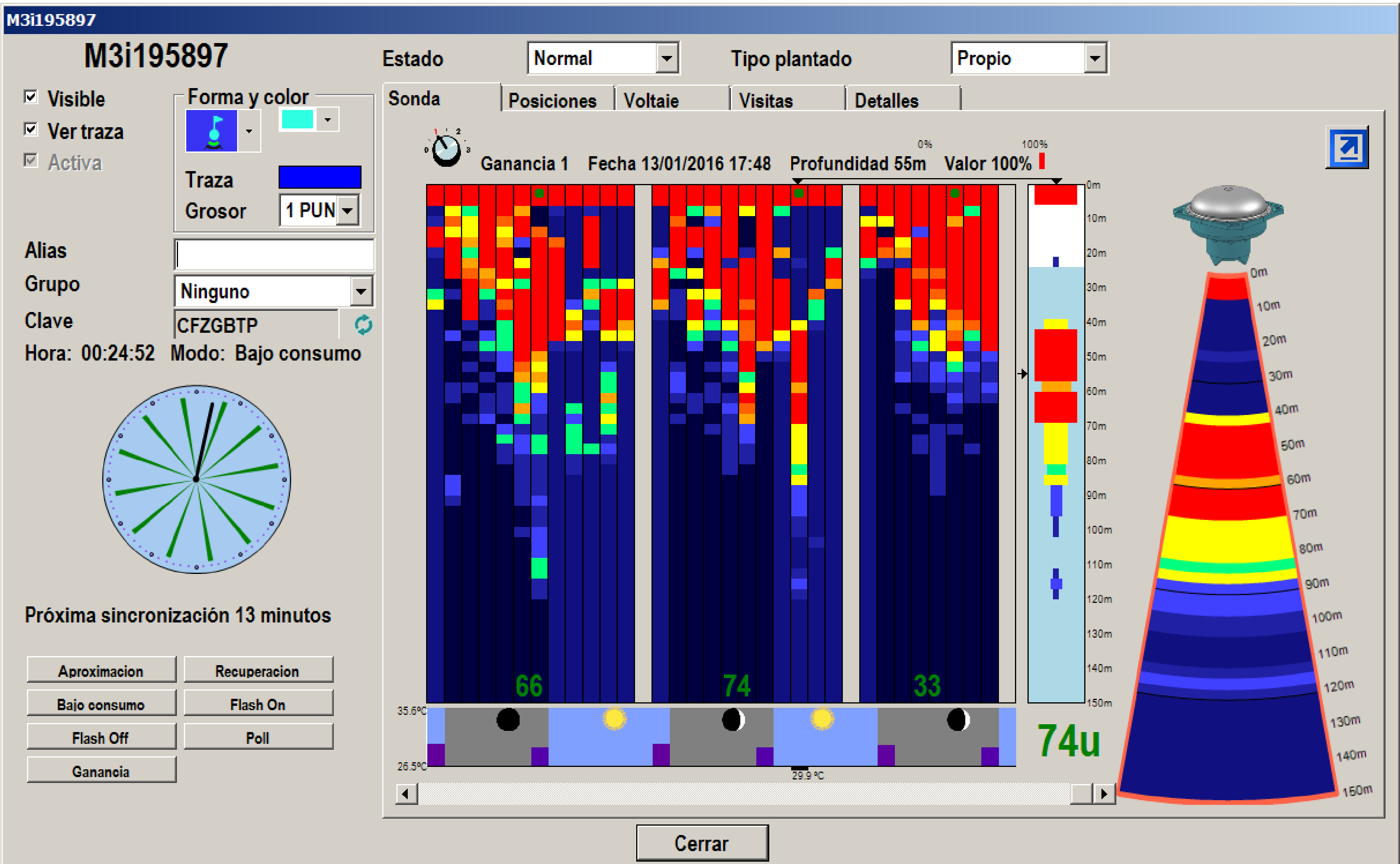
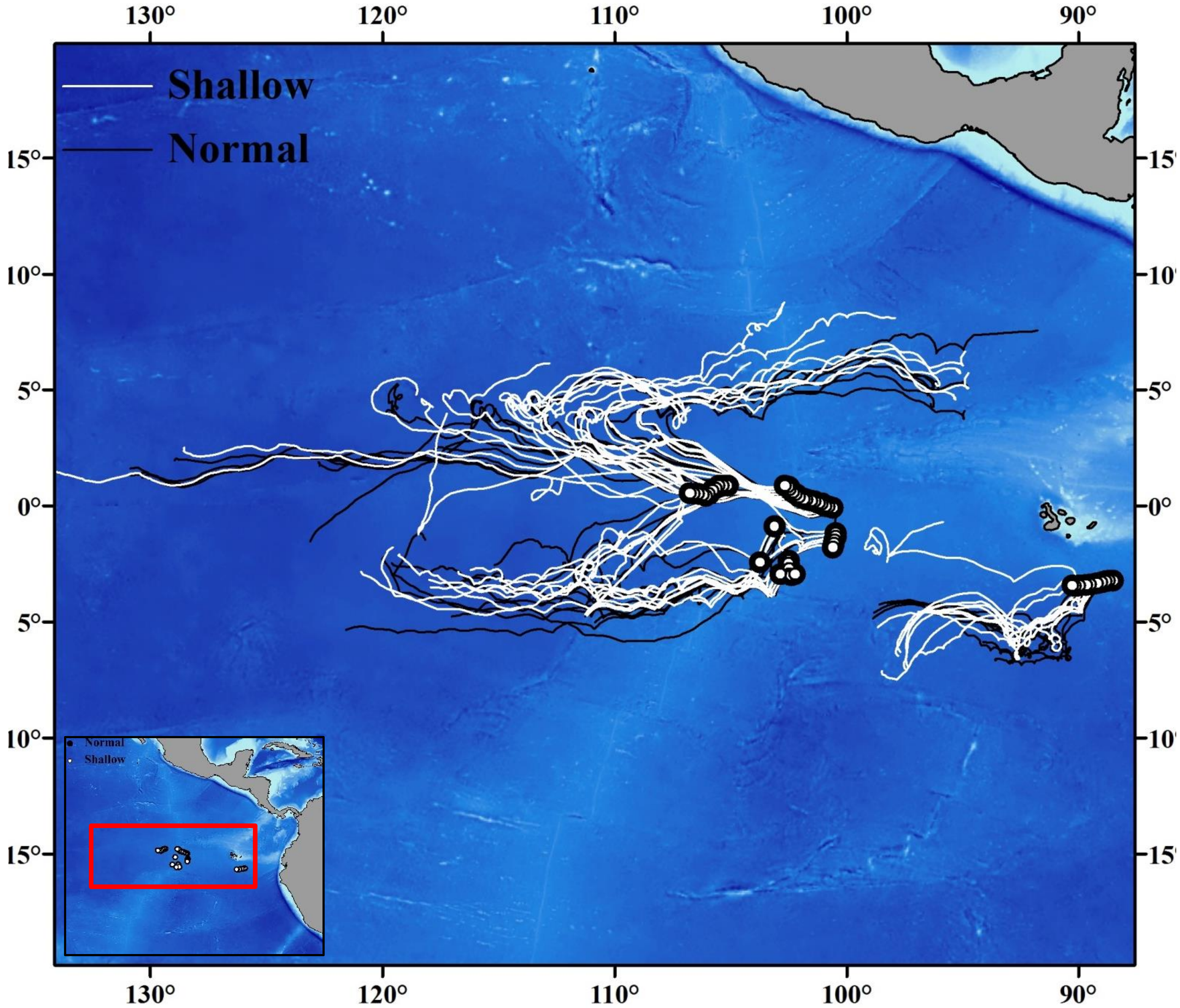
• The echo-sounder data recorded by the M3i buoys is being archived for future analyses. A relative value (U) is provided as an estimation of total fish biomass for each detection and for the highest value per day. In the raw echosounder data (numerical) a value of 0 to 7 is provided representing the density of fish biomass within each of 50 layers (3 meter each). These data will be utilized to evaluate the potential for estimating tuna species catch composition, and also exploring the dynamics in colonization of FADs by tunas.

Individual M3i echo-sounder buoy (50 KHz) display for a shallow depth FAD with an associated aggregation



Preliminary Results

Deployment locations and drift trajectories during the first 60d for 50 normal and 50 shallow depth FADs



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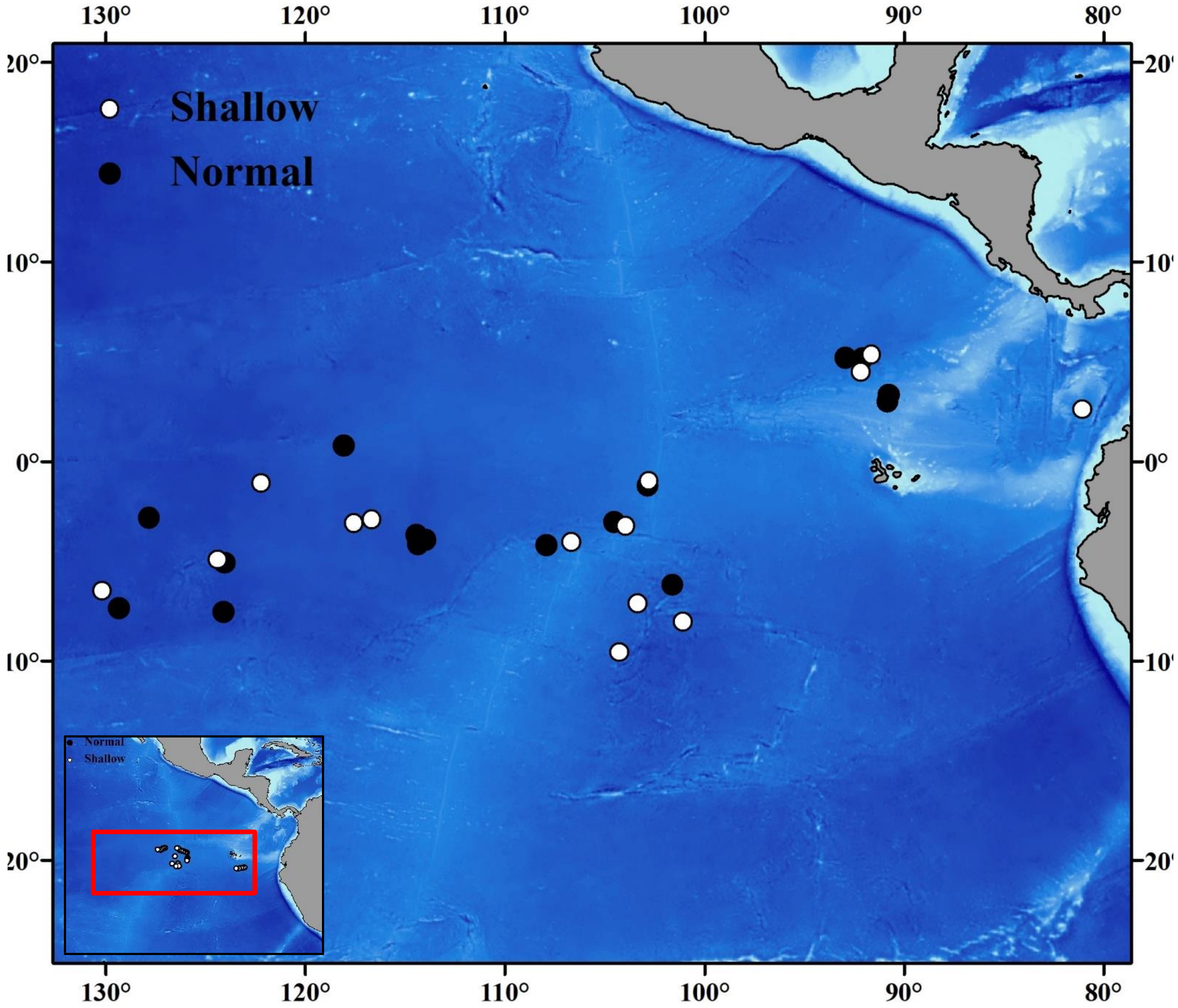
Set locations on 21 normal and 16 shallow depth FADs



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Summary of set and catch metrics for 37 sets by seven NIRSA vessels on normal and shallow depth FADs

	Normal	Shallow
Number of sets	21	16
Range in set dates	7/16/2015 - 05/10/2016	7/19/2015 - 04/13/2016
Range in set locations	-15.18 S - 5.22 N	9.55 S - 5.37 N
	90.77 - 145.70 W	81.08 - 133.18 W
Average (range) SKJ catch (t)	8.8 (1 - 20)	10.4 (0 - 58)
Average (range) BET catch (t)	5.3 (0 - 38)	4.9 (0 - 35)
Average (range) YFT catch (t)	1.0 (0 - 7)	2.1 (0 - 13)
Average (range) total tuna catch (t)	13.8 (1 - 48)	17.4 (1 - 63)
Average (range) proportion of BET	0.27 (0 - 0.80)	0.24 (0 - 0.83)

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- ANOVA indicated there was no significant difference in the average daily drift speeds between the normal depth (0.80 kn; 0.41-1.18) and shallow depth (0.81 kn; 0.45-1.10) FADs, for the first 60 days following deployments ($F = 0.45$, $P = 0.50$)

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- The catch data collected thus far from sets on normal and shallow depth FAD types is inadequate for conducting a valid statistical analyses, utilizing an appropriate model, to evaluate whether FAD depth is a significant factor with respect to bigeye catch composition while accounting for set location, month, and other factors

Conclusions

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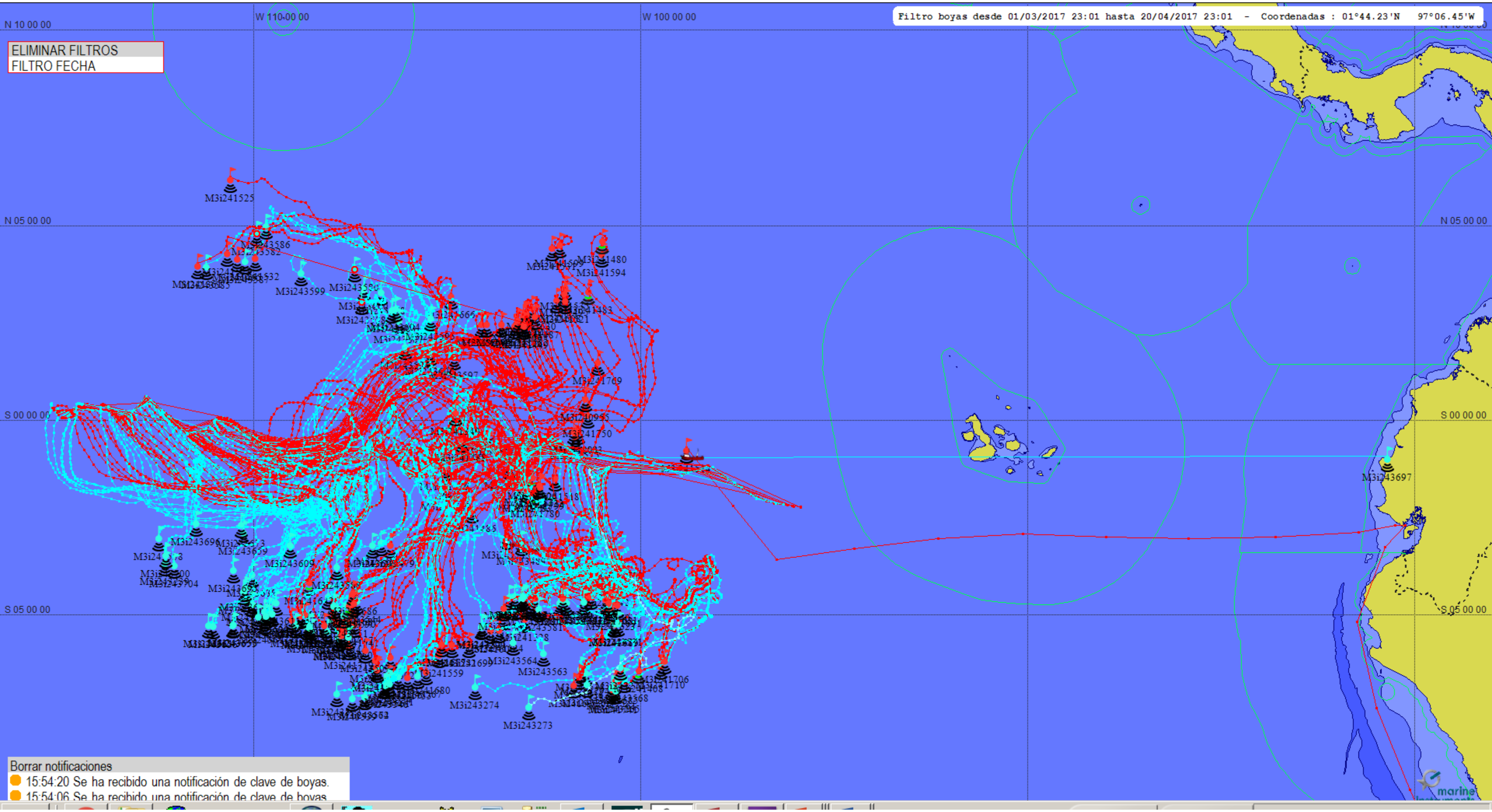
- We expect to obtain data from a sufficient number of sets on both FAD types from experiment 2, combined with those from experiment 1, to conduct an appropriate statistical analyses to test the **null hypothesis *Ho*: there is no difference in the proportion of BET caught in sets on normal and shallow depth FADs in the equatorial EPO**.

100 normal and 100 shallow depth FADs deployed March 2017 by the NIRSA purse-seine vessel Via Simoun



Acknowledgements

- ISSF
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- IATTC