Towards acoustic discrimination of tuna species at FADs

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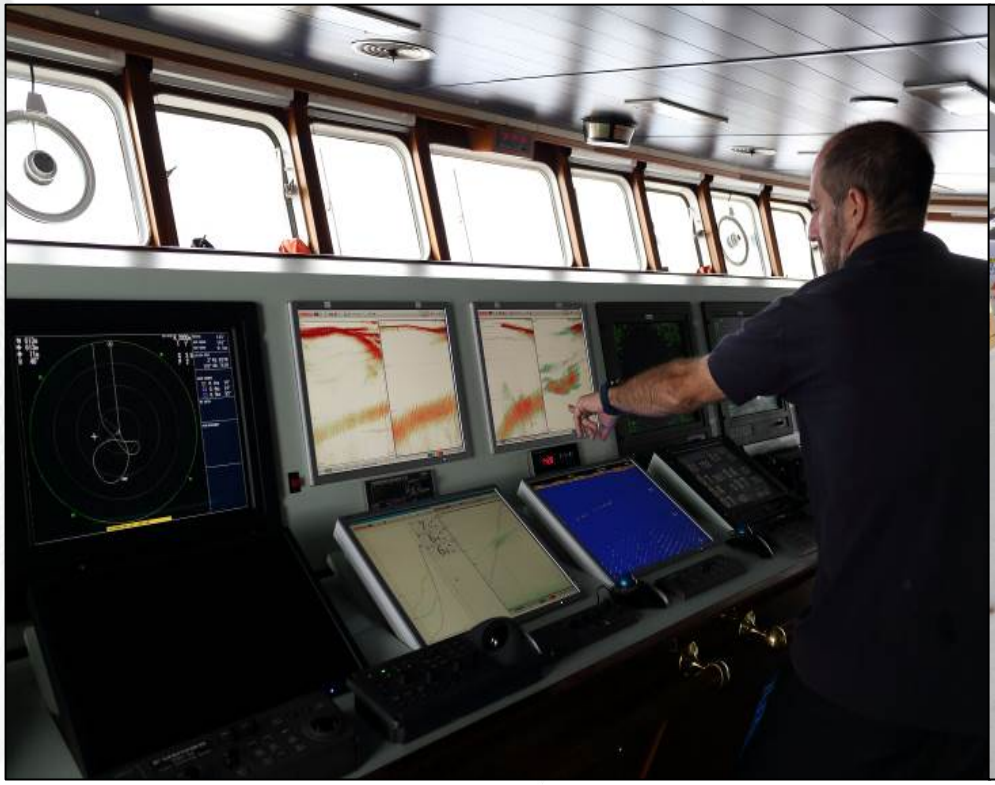
ISSF INTERNATIONAL SEAFOOD SUSTAINABILITY FOUNDATION

OBJECTIVES:

1. Mitigation of Undesired catches

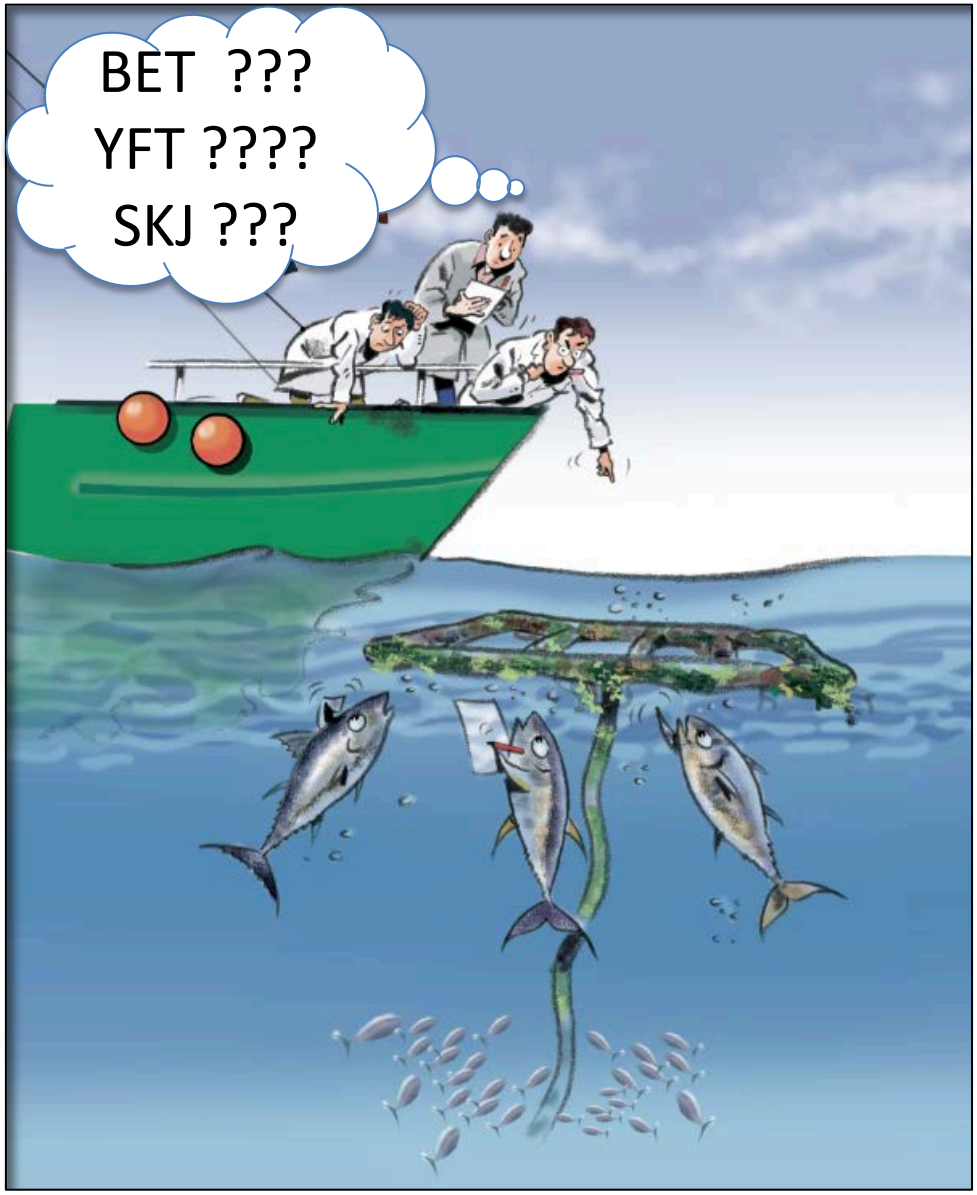


Equipment onboard

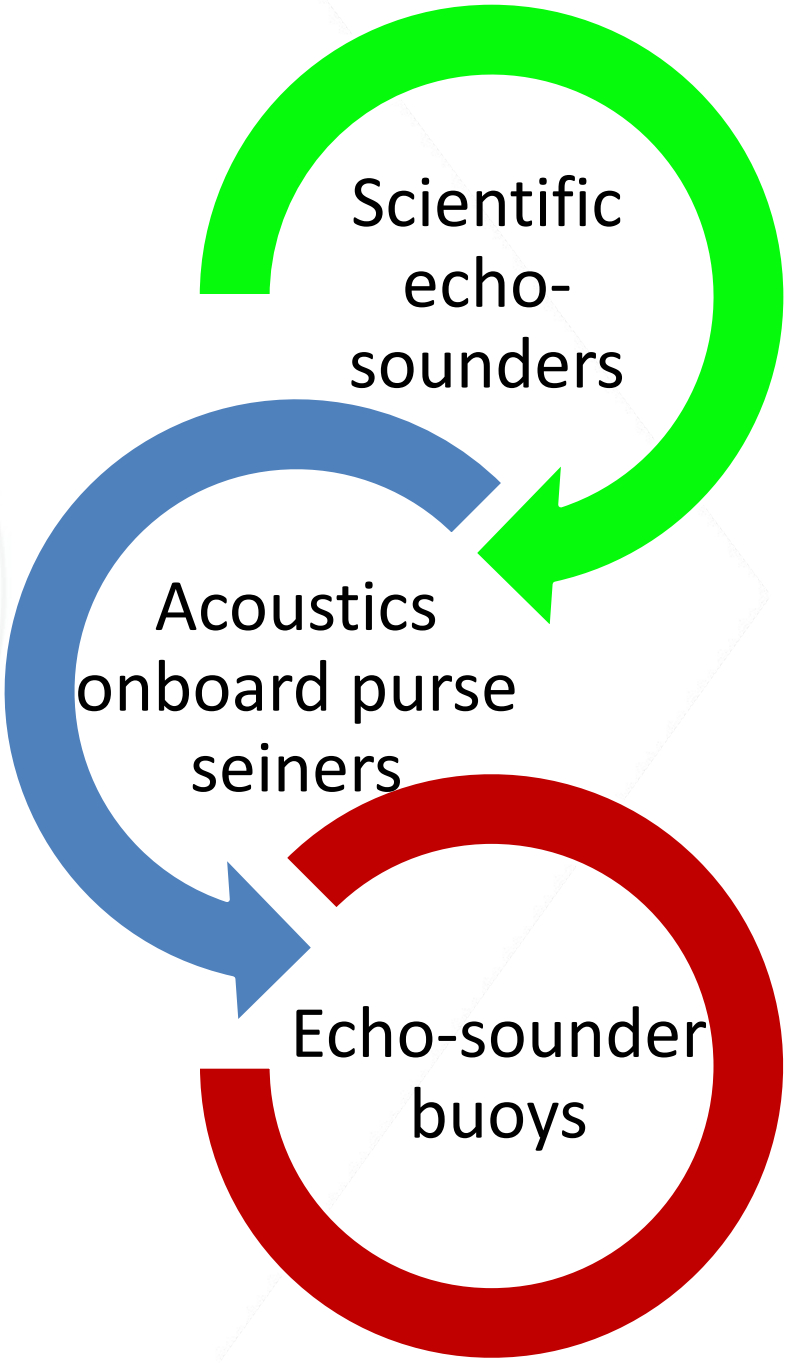
Echo-sounder buoys

OBJECTIVES:

2. Abundance estimates by species



Knowledge transfer & application



- Target Strenght
- Creation of Discrimination mask

- By-catch mitigation: Fishing tactic dependent
- Abundance: dependent from the fishery

- Remote By-catch mitigation.
- Abundance: independent from the fishery

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Method

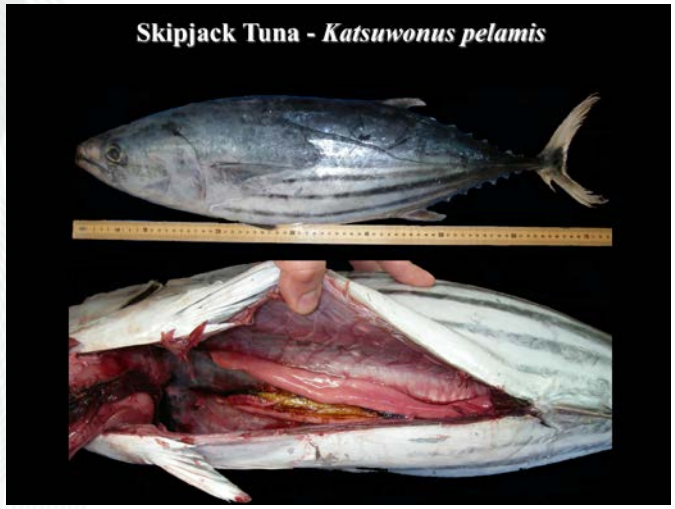
Species discrimination using Multiple frequencies

Target Strenght (TS)
SKJ, BET ,YFT

Mask based on frequency response

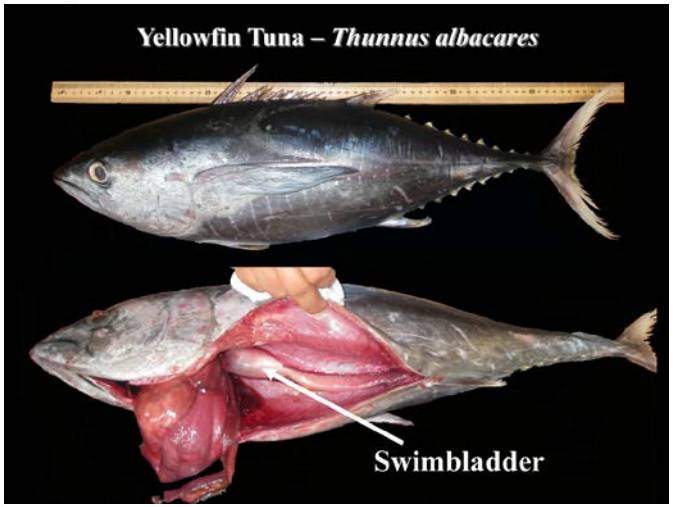
Why multiple frequencies?

Skipjack



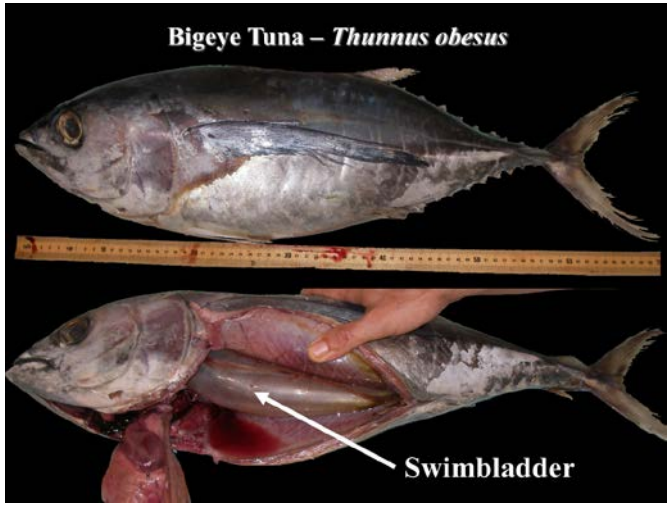
Non- Swim-bladder

Yellowfin



Swim-bladder fish

Bigeye



Swim-bladder fish

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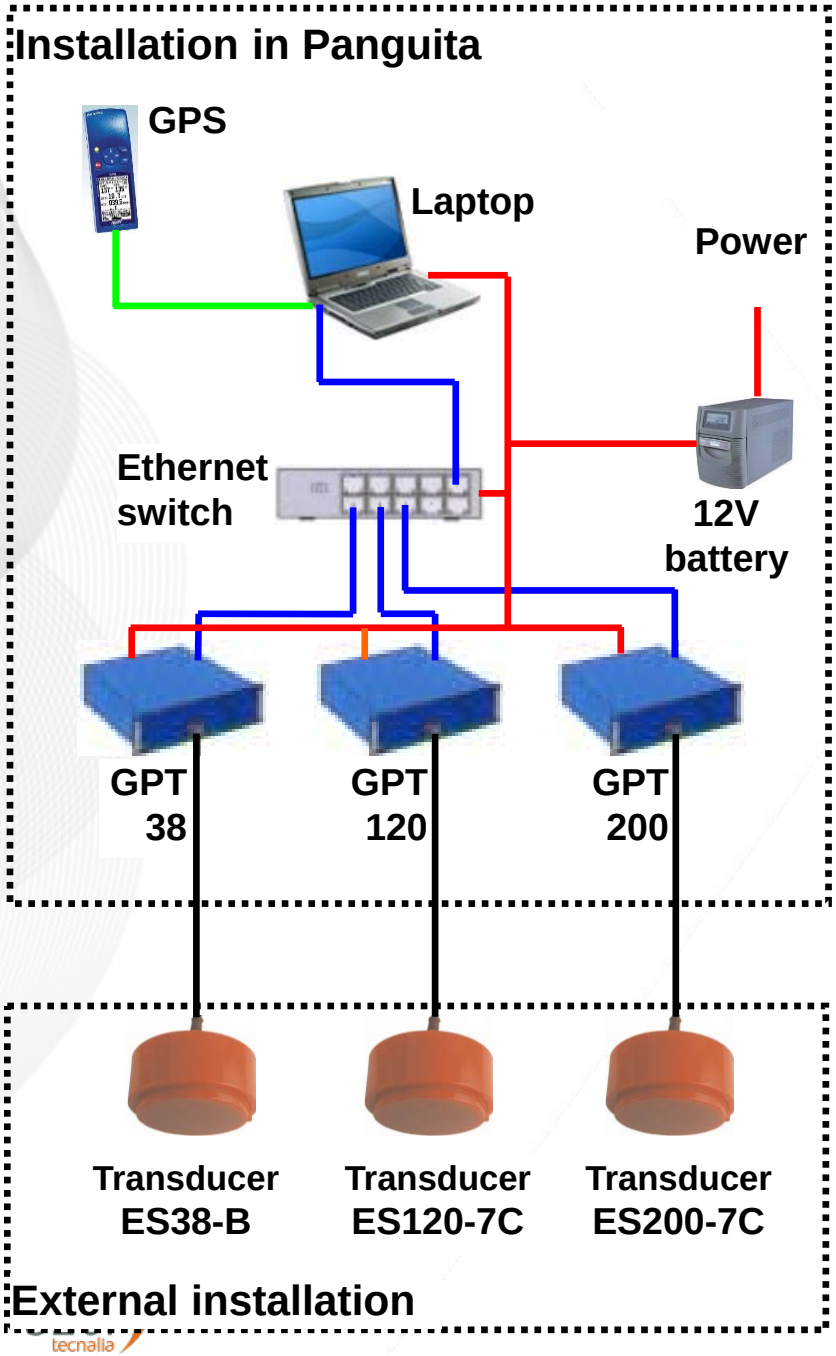
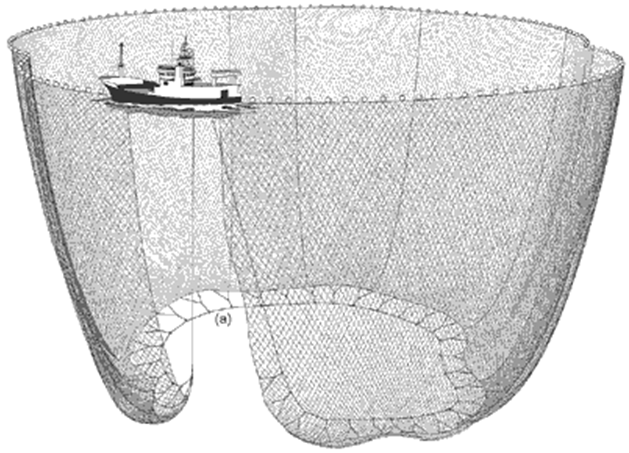
EK60 Installation



Frequency (kHz)	Pulse duration (us)	Transmit power (W)	Transducer gain (dB)	Sa Correction (dB)	Beam angle (degrees)	Ping rate (Hz)
38	512	1400	26.16	-0.86	7	0.5
120	512	150	25.96	-0.39	7	0.5
200	512	90	27.09	-0.34	7	0.5

Protocol at sea: Central Pacific Ocean

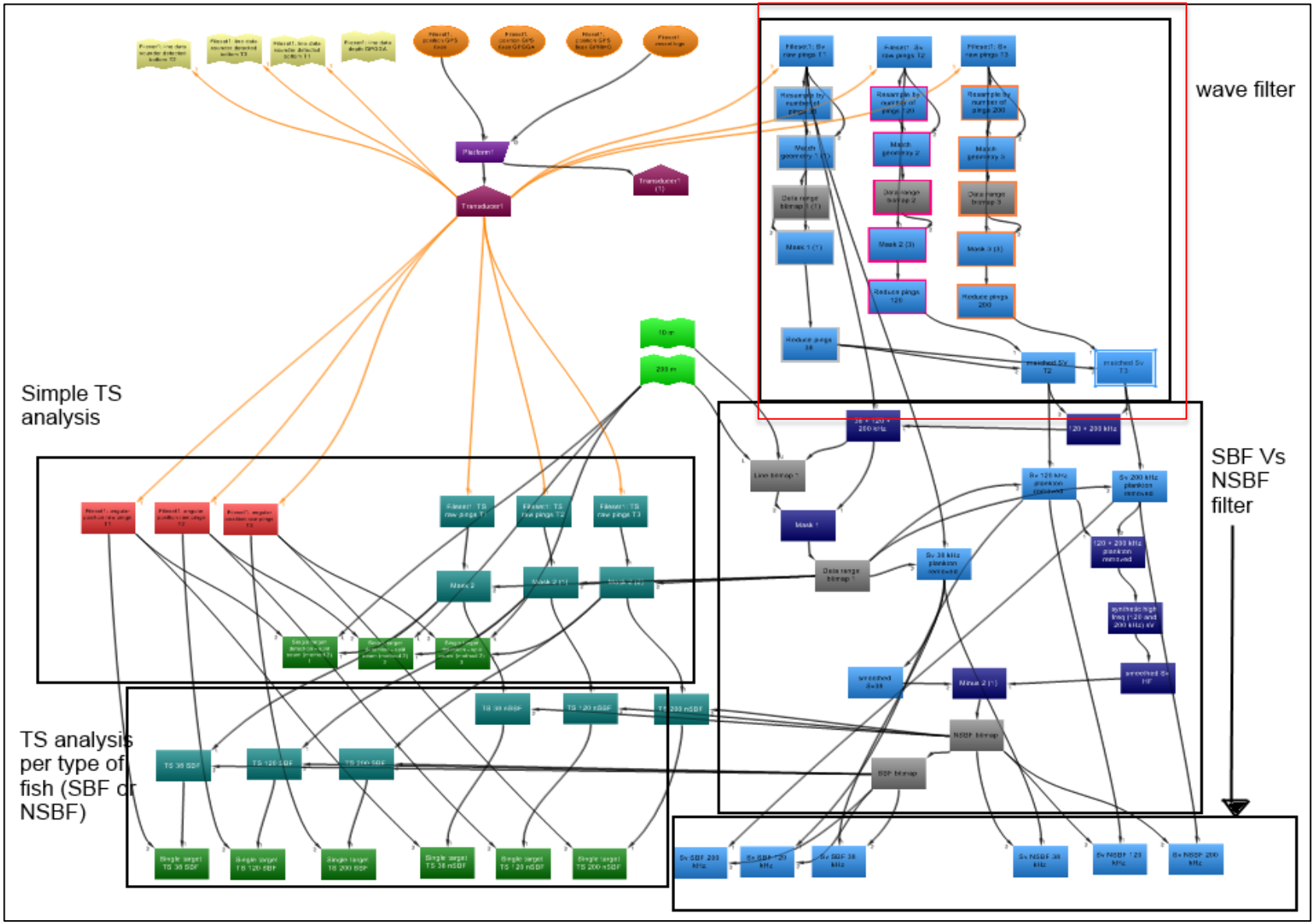
Albatun 3



Acoustic measurements at FADs → Catch → Spill sampling

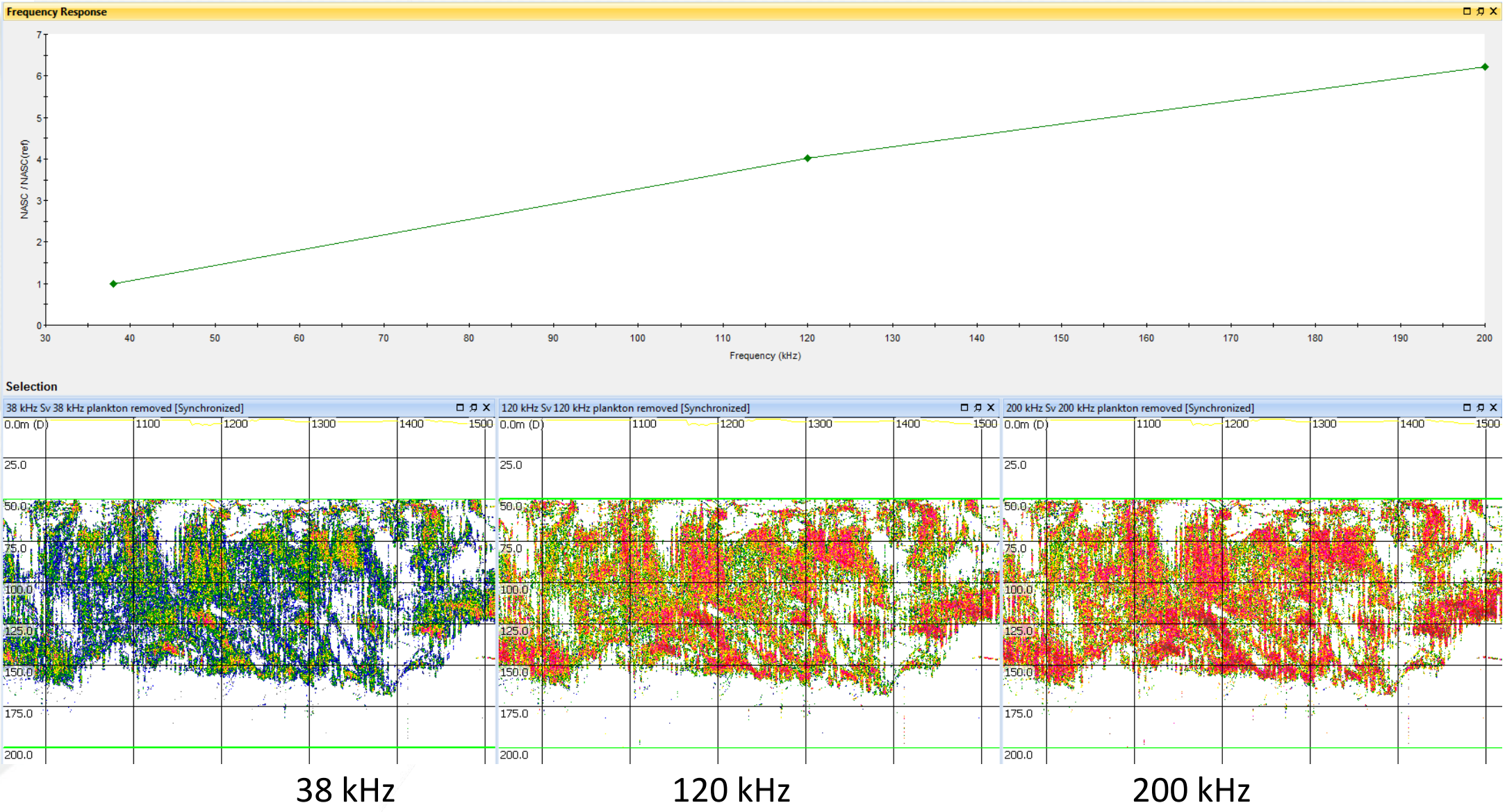
Data processing

Pre-processing :

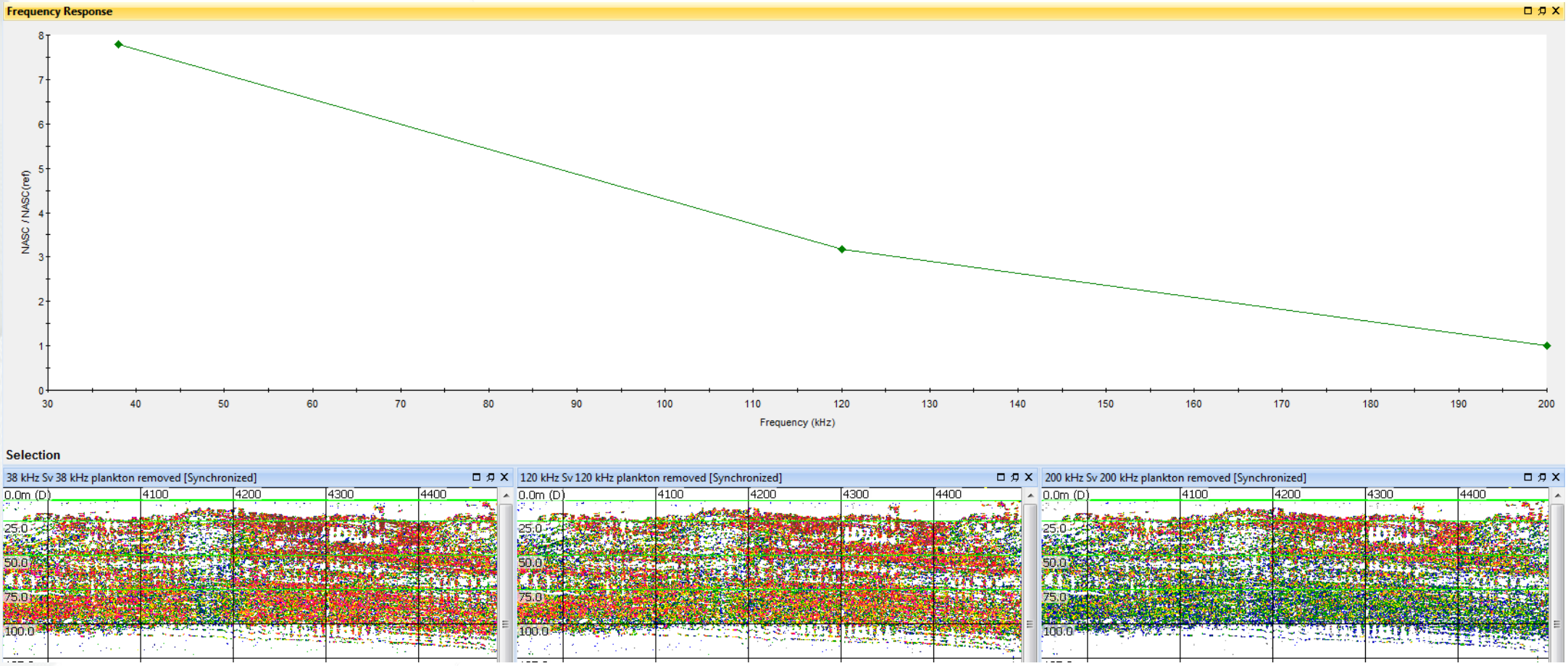


Methods from Ballón et al (2011) and Korneliusen (2010)

RESULTS: Frequency Response for SKJ



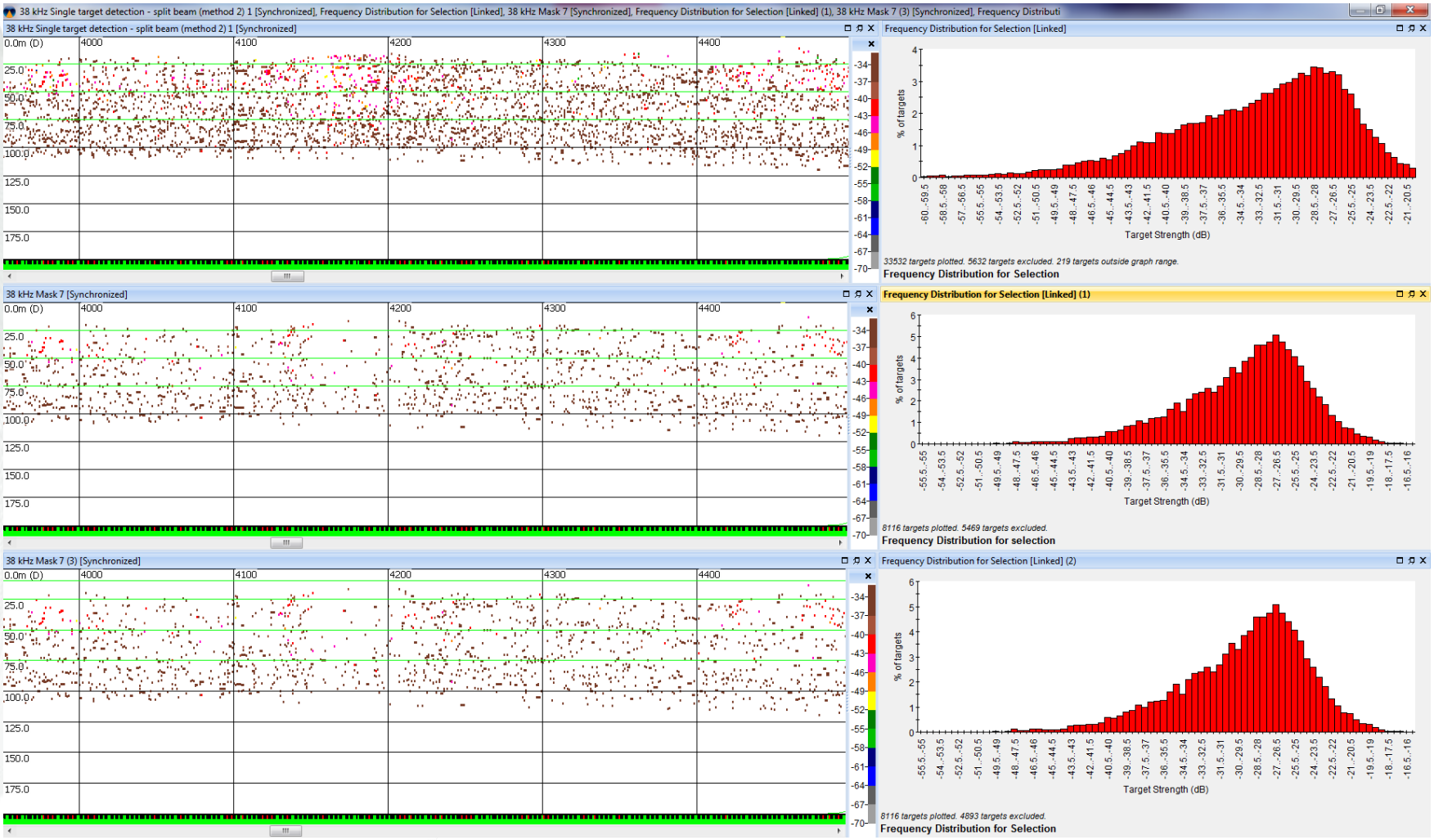
RESULTS: Frequency Response for BET



38 kHz 120 kHz 200 kHz

BET FREQUENCY RESPONSE

TS ANALYSIS FOR BET A 3 STEP FILTERING PROCESS



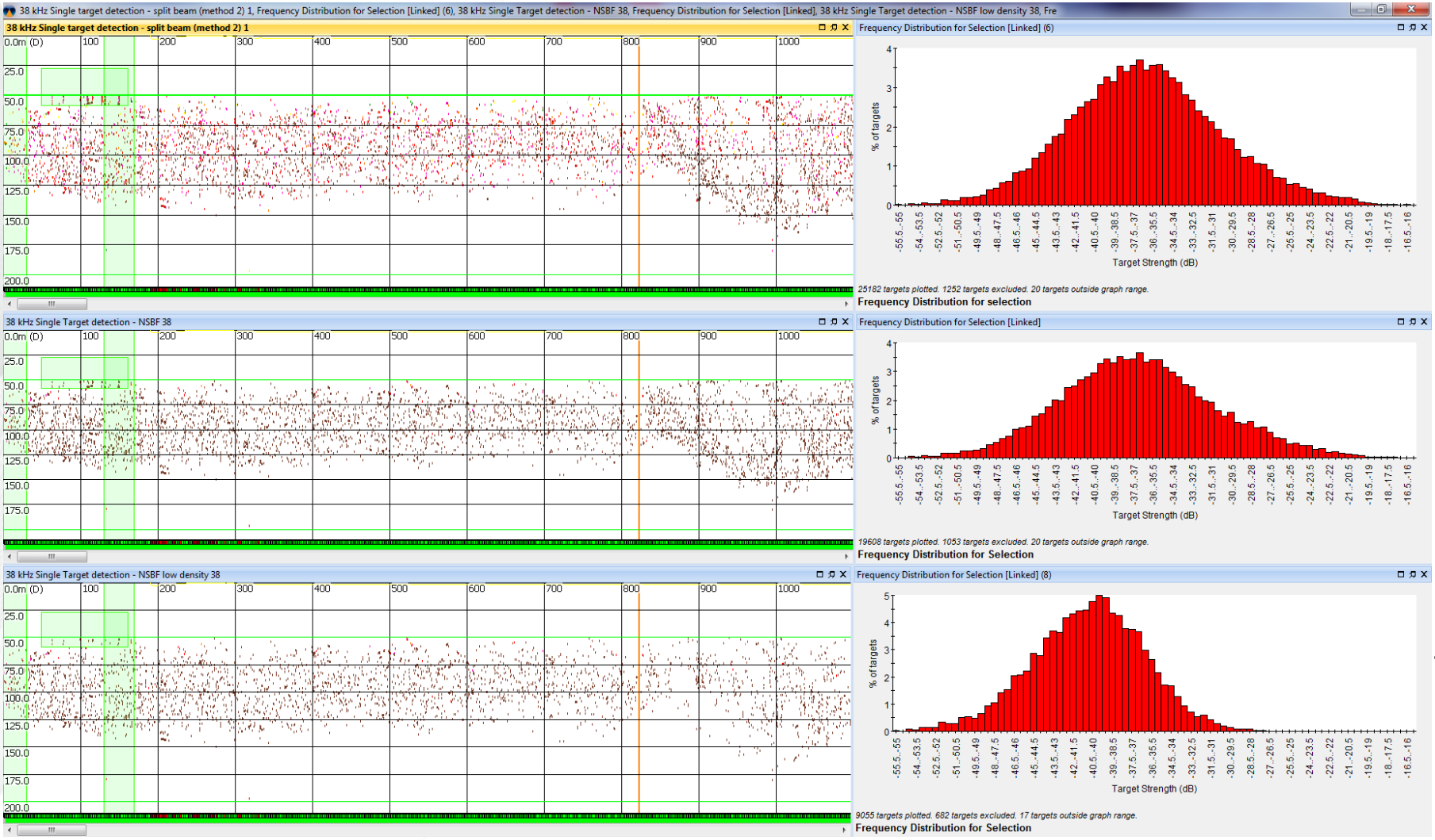
1. NO FILTER

2.SBF/NSBF FILTER

3. DENSITY FILTER

38 kHz

TS ANALYSIS FOR SKJ: A THREE STEP FILTERING PROCESS



NO FILTER

SBF/NSBF FILTER

SBF/NSBF FILTER + LOWPASS DENSITY FILTER

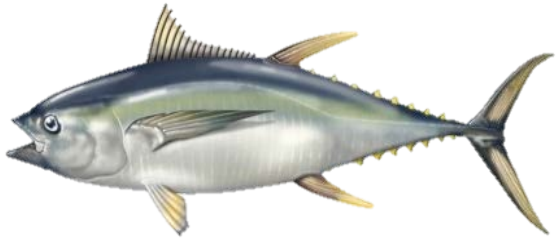
38 kHz

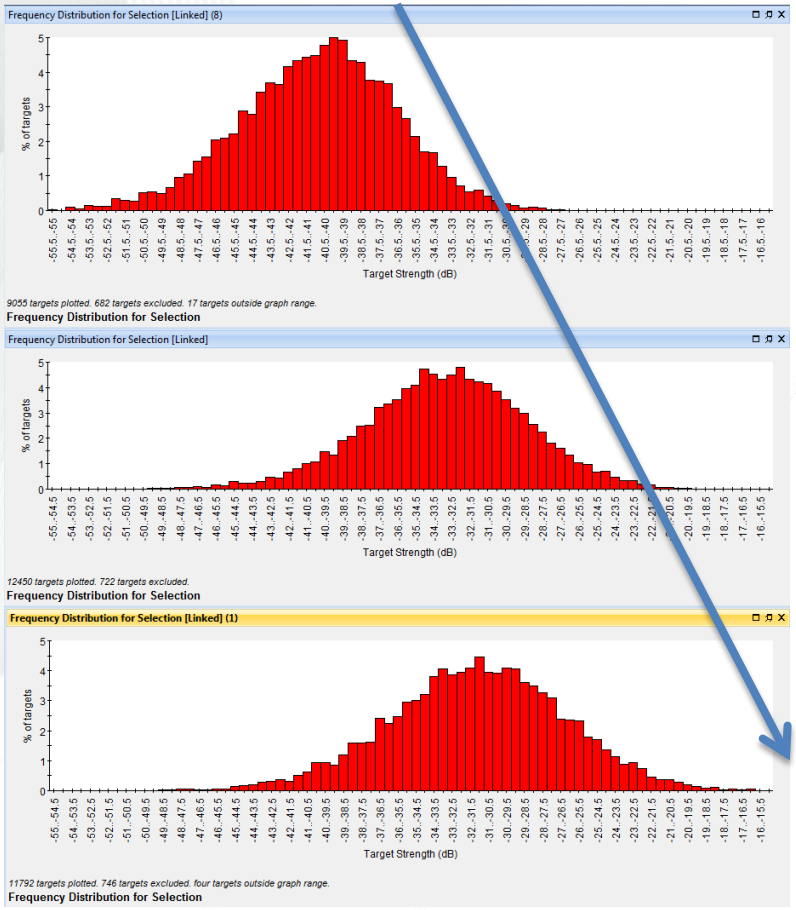
TS DISTRIBUTIONS FOR BOTH SPECIES

SKJ

FREQ	SKJ	BET
38	-40	-26.75
120	-32.25	-30.75
200	-31.25	-36.5

BET

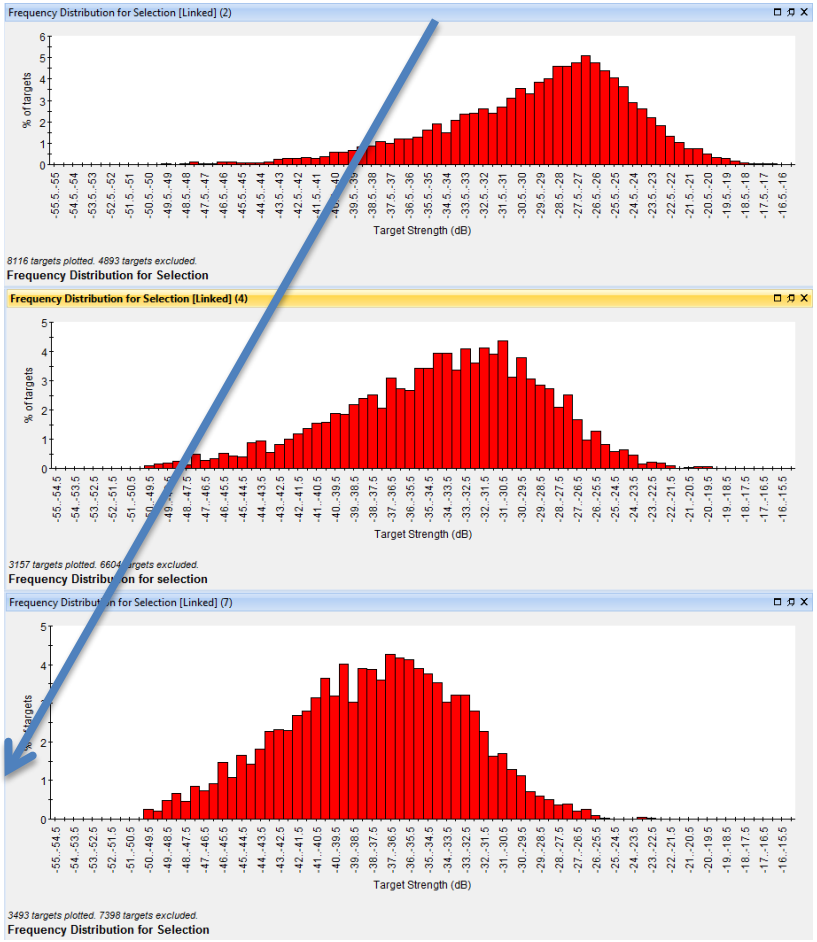




38 kHz

120 kHz

200 kHz



CONCLUSIONS

- The potential to discriminate between species using multifrequency is confirmed.
- Observed in situ TS varied during the set for the same size and species of fish due to different behaviour of fish.
- Obtaining TS of SKJ and BET was possible thanks to applying species and density filters.
- There is no echo-sounder buoy with discrimination capability.

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NEXT STEPS

- Obtain Target Strength for Yellowfin tuna.
- Discriminate YFT and BET
- Obtain Sizes from TS values
- Transfer knowledge to manufacturers

NEXT ISSF CRUISE: ATLANTIC 2015

GRACIAS, MERCI, THANKS, ESKERRIK ASKO

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