# Post-release survival of sharks captured by purse seine in the EPO

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## EPO May-July 2011, April 2012





## Main objectives

- Determine the post-release survival of sharks captured during seine activities on FADs
- Correlate the condition at-capture to survival
- Quantify the at-capture stress levels

## In short

- documented vertical profiles for dissolved oxygen and temperature on FADs before sets
- total sharks captured:
  - 53 silky shark
  - 6 scalloped hammerheads,
  - 1 mako
- total miniPATs deployed:
  - 18 silky
  - 3 hammerhead

## Summary of catch

- Industry averages

  -30 tons of tuna per set
  -0.3 sharks per set

  2011

  -104 tons of tuna per set
  -5.7 sharks per set
- 2012
  - ~38 tons
  - ~2.8 sharks per set



May 27, Set 1: 130 tons, 0 sharks

## 2011, 2012 (very similar)





Oshitani et al (2003)

## **Shark Condition**

		<u>Silky</u>	hh
•	<ul> <li>1 (Excellent)</li> <li>Very active and energetic, nearly dangerous requires significant restraint and caution</li> </ul>	<b>1</b> IS,	2
•	<ul> <li>2 (Good)</li> <li>Moderately active and energetic, requires moderate restraint</li> </ul>	2	1
•	<ul> <li>3 (Fair)</li> <li>Tired and sluggish, responsive, requires no restraint</li> </ul>	8	2
•	<ul> <li>4 (Poor)</li> <li>Exhausted, minimal signs of life yet non-responsive</li> </ul>	10	1
•	5 (Unacceptable) – Dead or nearly dead	32	0

## Capture-related mortality

32 of 53 sharks were dead upon brailing



- Do our results accurately reflect survivability in the industry? Or are they confounded by the above average landings?
  - Smallest set: 2011 (set 3); 26 tons
    - Three sharks (60-87cm) assumed to have died
    - All revived and swam upon release
    - One tagged and died
    - One hour seine, 20 minute brail



Male, 60cm

#### tag#469 (30 days): 87 cm FL (m), ~8 kg (condition 4)



#### tag#493 (30 days):133 cm FL (f), ~30 kg (condition: 4)



## Stress Physiology: ISTAT Blood Gas Analysis

pН	pCO2 (mmHg)	pO2 (mmHg)	Lac (mmol/L)
<6.5	49.3	42	19.31
<6.5	46	17	15.11

## Survivors

- 2 snagged, not brailed (2011)
- Early during seine retrieval
- Unknown length of time snagged
- Out of the water ~10 minutes
- 3 in the first brail (2012)



June 23, Set 9 (03°21 N,100° 40 W): 190 tons, 17 sharks

## Example of a Survivor

- Female: 131cm FL (157cm TL)
  - Release condition: 1
  - Tagged June 4, 2011
  - 45 day program
  - Premature release: 16 days at liberty
- Behavior
  - Average depth and temperature: 31.6m/27.3°C
  - Maximum depth: 217.5m
  - Minimum temperature: 12.9°C

mean depth: 31 m (max: 217 m) mean temperature: 27°C (min: 12.9°C)









## Summary

- Silky ~90% mortality
- Hammerhead ~100% mortality
- Snagged sharks have a chance
- Sharks in 1<sup>st</sup> brail have a chance (under 10 min)

\* One neonate was snagged in the seine, not brailed, moderately injured, released without tag, and swam away.

max length ~350 cm *TL* max mass ~346 kg max age ~25 yr size at maturity 228 cm (202-228 cm)



Oshitani et al (2003)



## **EPO** shark experiments



#### June 23, Set 9 (03°21 N,100° 40 W): 190 tons, 17 sharks

- ~90% mortality
- 2 survivors were not brailed (2011)
- 4 revived (1 tagged, but died)
- -3 survived in 2012 (15 ton, 22 ton, 1<sup>st</sup> brail)