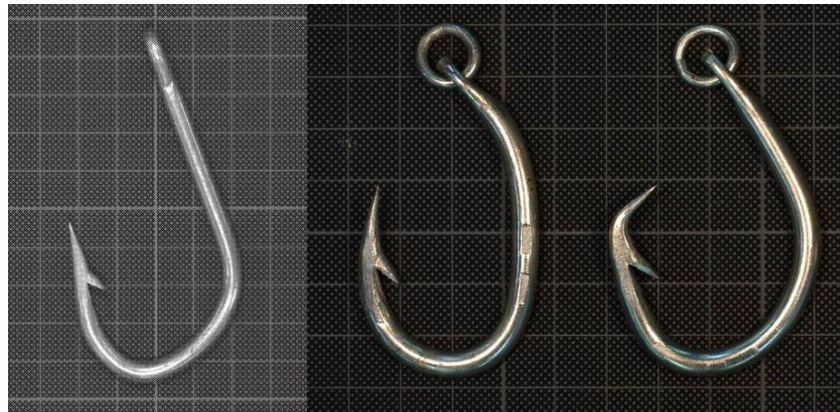


# Review of studies on catch rates of commercial and bycatch species by hook type using in pelagic tuna longline fisheries



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# Introduction

Main targets in pelagic longline fishery



- Bigeye (*Thunnus obesus*)
- Bluefins (*T. thynnus*, *T. orientalis* and *T. maccoyii*)
- Swordfish (*Xiphias gladius*) etc.

Bycatch is one of important issues for the pelagic longline

- Sea turtles
- Non-target sharks
- Non-target finfish etc.

It is needed to reduce bycatch  
without reducing catch of target species

# Introduction

## Shallow and deep sets

Depends on the target species, fishermen change the setting depth

Depends on the setting depth, they are classified into 2 categories

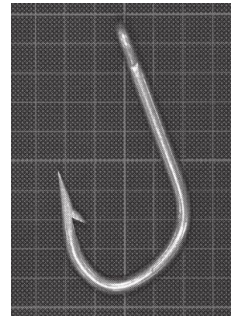
**Shallow-set:** Mainly targeting on billfish or sharks

**Deep-set:** Mainly targeting on many species of tunas

## Hook type

Various sizes and shapes

Categorized into 3 types



J hook  
(**J**)



Japanese  
tuna hook  
(**Tuna**)



Circle  
hook  
(**C**)

## IATTC-RESOLUTION for sea turtles (C19-04)

For **shallow-set fishing manner, employ either finfish-bait or large circle hooks**

an interest to expand this to the other types of operations

### Objectives for this study

Is there adequate scientific basis:

- ✓ to evaluate the effects of hook types on catch rates of target and non-target species in shallow and deep sets?
- ✓ to evaluate mitigation effect of utilization of C hooks in deep-sets?

# Materials and methods

## Reviewed literatures

A total of 40 study cases in 33 literatures

## Categorizations

- ✓ Deep vs shallow sets

**Shallow-set: 10 hooks or less in HBF**

**Deep-set: more than 10 hooks in HBF**

(Common Oceans (ABNJ) Tuna Project 2017)

- ✓ Hook types (i.e. J vs C and Tuna vs C)

# Materials and methods

The number of study cases was counted which reported significantly higher catch rate **by each species**

**J vs C hooks**

or non-significant (NS)

**Tuna vs C hooks**

or non-significant (NS)

# Results: Number of study cases

## Shallow and deep sets

**Shallow-set: 25 cases in 21 literatures**

**Deep-set: 6 cases in 5 literatures**

Studies for **deep-set** are **much less** than **shallow-set**

## Hook type

**J vs C hooks: 19 cases in 17 literatures**

**Tuna vs C hooks: 11 cases in 9 literatures**

**Both: 1 case in 1 literature**

Studies for **Tuna vs C hooks** are **less** than **J vs C hooks**

# Results: **Shallow-set**

## J vs C hooks

## Tuna vs C hooks

Species	No. of study cases				No. of study cases			
	J High	C High	NS	Total	Tuna High	C High	NS	Total
<b>Tuna</b>								
Bigeye		<b>3</b>	<b>4</b>	<b>7</b>			<b>2</b>	<b>2</b>
Yellowfin		<b>3</b>	<b>3</b>	<b>6</b>		<b>1</b>	<b>2</b>	<b>3</b>
Albacore		<b>4</b>	<b>2</b>	<b>6</b>				<b>0</b>

Reported **higher** catch rates of **large circle hook**



# Results: Shallow-set

Species	No. of study cases				No. of study cases			
	J High	C High	NS	Total	Tuna High	C High	NS	Total
<b>Shark</b>								
Blue shark		<b>4</b>	<b>5</b>	<b>9</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>
Shortfin mako		<b>1</b>	<b>4</b>	<b>5</b>			<b>1</b>	<b>1</b>
Silky		<b>1</b>		<b>1</b>		<b>2</b>		<b>2</b>
Oceanic whitetip		<b>1</b>	<b>1</b>	<b>2</b>				<b>0</b>
<b>Turtle</b>								
Leatherback	<b>4</b>		<b>1</b>	<b>5</b>				<b>0</b>
Olive ridley	<b>1</b>		<b>1</b>	<b>2</b>	<b>2</b>		<b>1</b>	<b>3</b>
Loggerhead	<b>3</b>		<b>3</b>	<b>6</b>	<b>1</b>			<b>1</b>
Green/Black			<b>1</b>	<b>1</b>	<b>2</b>		<b>1</b>	<b>3</b>

# Results: **Deep-set**

## J vs C hooks

## Tuna vs C hooks

Species	No. of study cases				No. of study cases			
	J High	C High	NS	Total	Tuna High	C High	NS	Total
<b>Tuna</b>								
Bigeye			<b>1</b>	<b>1</b>		<b>1</b>	<b>1</b>	<b>2</b>
Yellowfin			<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>		<b>2</b>
Albacore			<b>1</b>	<b>1</b>	<b>2</b>			<b>2</b>

The lack of studies in **deep-set**

# Results: Deep-set

## J vs C hooks

## Tuna vs C hooks

Species	No. of study cases				No. of study cases			
	J High	C High	NS	Total	Tuna High	C High	NS	Total
<b>Shark</b>								
Blue shark	<b>1</b>			<b>1</b>	<b>1</b>	<b>1</b>		<b>2</b>
Showtfin mako			<b>1</b>	<b>1</b>	<b>1</b>			<b>1</b>
<b>Turtle</b>								
Leatherback							<b>1</b>	<b>1</b>
Olive ridley							<b>1</b>	<b>1</b>

Hook type reported **higher catch rate** for each species  
was **not always same** among studies

# Discussion

- There is inadequate information to evaluate the catch rates of target and non-target species for:
  - Deep-set
  - Tuna vs C hooks
- Using C hook resulted in significant increase of bycatch rates of shark species
- In deep-set, few studies directly compared the difference of bycatch rates of sea turtles by hook types

Need further information on catch rates for the target and non-target species of C hooks used in deep-set through experimental fishing practices

Thank you for your attention