# All Aboard the MFV TACOMA Teacher Resource

A two hour visit onboard the *TACOMA* provides an authentic learning environment for students to develop rich understandings about life onboard an early 20<sup>th</sup> century TUNA CLIPPER.



## **Content**

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The TACOMA education program for schools has been developed through a partnership between DECD Outreach Education, Tacoma preservation society and the South Australian Maritime Museum. Outreach Education is a team of seconded teachers based in public organisations.



int of South Australia Department for Education and



## Australian Curriculum Links

#### Learning engagements enable students to develop knowledge, skills and understandings identified in the Australian Curriculum: History, Science, Geography and Mathematics.

#### History:

Historical skills		Historical knowledge & understandings	
•	Locate information related to inquiry questions	•	What do we know about the lives of people in
	in a range of sources		Australia's colonial past and how do we know?
٠	Identify points of view in the past and present	•	What were the changing features of the
•	Use historical terms and concepts		movements of people from 1750 to 1918?
•	Identify the origin and purpose of primary and	•	How do new ideas and technological
	secondary sources		developments contribute to change?
•	Locate, compare, select and use information		
	from a range of sources as evidence		

#### Mathematics:

Number &	Measurement and Geometry	Statistics and Probability
Algebra		
Year 5	• Choose appropriate units of measurement for length,	
	area, volume, capacity and mass	
	• Use a grid reference system to describe locations.	
	Describe routes using landmarks and directional	
	language	
	• Estimate, measure and compare angles using degrees.	
Year 6	• Investigate, with and without digital technologies,	<ul> <li>Interpret secondary data</li> </ul>
	angles on a straight line, angles at a point and vertically	presented in digital media
	opposite angles	and elsewhere
	• Convert between common metric units of length, mass	
	and capacity	
	• Solve problems involving the comparison of lengths and	
	areas using appropriate units	
	• Select and apply efficient mental and written strategies	
	and appropriate digital technologies to solve problems	
	involving all four operations with whole numbers	
Year 7	Solve simple numerical problems using reasoning	<ul> <li>Identify and investigate</li> </ul>
		issues involving numerical
		data collected from
		primary and secondary
		sources

#### **Geography:**

Year 4: Represent the location of places and their features by constructing large-scale maps that conform to cartographic conventions including scale, legend, title and north point, and describe their location using simple grid references, compass direction and distance.

Year 5: Represent the location and features of places and different types of geographical information by constructing large-scale and small-scale maps that conform to cartographic conventions, including border, source, scale, legend, title and north point, using spatial technologies as appropriate.

Year 6: Evaluate sources for their usefulness and represent data in different forms, for example, maps, plans, graphs, tables, sketches and diagrams.

Year 7: Apply geographical concepts to draw conclusions based on the analysis of the data and information collected.

#### Science:

Inquiry skills:

- Plan appropriate investigation methods to answer questions or solve problems
- Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data using digital technologies as appropriate
- Compare data with predictions and use as evidence in developing explanations
- Suggest improvements to the methods used to investigate a question or solve a problem
- Communicate ideas, explanations and processes in a variety of ways
- Collaboratively and individually plan and conduct a range of investigation types, including fieldwork and experiments, ensuring safety and ethical guidelines are followed

#### Science as a Human Endeavour:

- Science understanding influences the development of practices in areas of human activity such as industry, agriculture and marine and terrestrial resource management
- Scientific knowledge changes as new evidence becomes available, and some scientific discoveries have significantly changed people's understanding of the world
- People use understanding and skills from across the disciplines of science in their occupations
- Scientific knowledge changes as new evidence becomes available, and some scientific discoveries have significantly changed people's understanding of the world
- Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries

#### **General capabilities:**

In the Australian Curriculum, the general capabilities encompass the knowledge, skills, behaviours and dispositions that, together with curriculum content in each learning area and the cross-curriculum priorities, will assist students to live and work successfully in the twenty-first century.

**Literacy:** Students develop literacy capability as they learn how to build historical knowledge and to explore, analyse, question, discuss and communicate historical information, concepts and ideas. Students understand that language varies according to context and they develop their ability to use language flexibly.

**Numeracy:** Numeracy involves students in recognising and understanding the role of mathematics in the world and having the dispositions and capacities to use mathematical knowledge and skills purposefully. Students learn to analyse numerical data to make meaning of the past, for example to understand cause and effect, and continuity and change.

**Critical and creative thinking:** Students develop capability in critical and creative thinking as they learn to generate and evaluate knowledge, clarify concepts and ideas, seek possibilities, consider alternatives and solve problems.

**Personal and social capability:** The History curriculum enhances personal and social capability by providing opportunities for students to engage with understandings such as historical empathy, contestability, perspectives, cause and effect, and continuity and change.

**Ethical behaviour:** Ethical behaviour involves students in building a strong personal and socially oriented ethical outlook that helps them to manage context, conflict and uncertainty, and to develop an awareness of the influence that their values and behaviour have on others.

### **Logistics**

• The TACOMA is berthed at TACOMA BERTH LINCOLN COVE MARINA

The program is suitable for students in Years 4 – 10

Cost is \$6 per student (1:5 ratio of adults free)

Program includes:

2 hour onboard the TACOMA

Time to explore the TACOMA and its many components from crow's nest to engine room The opportunity to navigate through the marina aboard one of Tacoma's two tenders I Please divide your students into 3 equal groups before your session.

2 Session times are: 10:00 to 12:00am 1:00 to 3:00pm

Your allocated time will be shown on your itinerary.



MAP SHOWING DIRECTION FROM SCHOOL

## **Safety**

The following guidelines are to ensure you get the most from your educational experience onboard the TACOMA.

#### **Teacher / Supervising Adult Responsibilities**

- The TACOMA education program is facilitated by volunteers. It is the teacher's responsibility to manage student behaviour on the vessel.
- Teachers are to accompany students on the vessel at all times.
- Please ensure one adult is available to supervise each group.
- Please be on time to ensure students have optimal time onboard the vessel.
- Students are to follow the directions of supervising adults and TACOMA volunteers.

#### Clothing

- Enclosed shoes must be worn.
- Access to the ship's deck is via a ladder, please wear suitable clothing.

#### **Expectations for students**

- Remind students that they are boarding a working vessel.
- When climbing ladders, always face the ladder and hold onto the hand rails.
- One person at a time on the ladders and stairs.
- Listen to the instructions of TACOMA volunteers and supervising adults.
- Stay with your group.
- Walk safely around the vessel and take care not to trip on the lines and ropes.
- Keep 2 feet on the deck at all times.

## **Program Overview**

### • <u>Helm</u>

Helming

/ Navigation

#### Overview:

- Exploring the helm area (eg. rudder and wheel)
- Navigation using a compass
- Reading charts and maps
- Echo sounders
- Watches

### DECKHOUSE and Accommodation

### Food and Accommodation

- Overview:
  - Design of galley area
  - Storage of food
  - Preservation of food
  - Types of food consumed on long voyages
  - Cooking onboard a Fishing Boat
  - Ship design (eg. doorways) STABALITY
  - Sleeping area and HEADS

### • Bow and STERN Ship

#### Rope, Lines

#### **Overview:**

- Exploring the STERN area
- Learning about the lines WINCHES
- Line handling

### • The Wharf:

(Conducted when an area of the vessel is unavailable) Sketching and drawing the vessel Knot tying and rope games





## **Pre and Post Visit Learning Engagements**

Interesting facts about the TACOMA

- It was built in 1944 and commissioned in April 1951.
- It is DESIGNED on the lines of a Californian seiner
- It can carry13 crew as a fishing boat but now in the bay a crew of 6 and 49 passengers
- It is a working vessel and has half way around Australia and Tasmania

### Pre Visit:

- There are many different types of sailing vessels, including designs and mast configurations. Look at the sailing vessels in *Appendix A* (or find some of your own). Research one of the vessels that interests you. Work with a partner who has researched a different vessel and use a Venn Diagram to compare two of the vessels.
- Bells are used on ships to mark the time, used as a fog signal or audible alarm in poor weather, to raise the attention of the crew and to call the passengers and crew to formal services. A ship's bell is usually made of bronze, and often has the ship's name engraved or cast on it. The ship's cook traditionally has the job of shining the ship bell. Identify the ways bells are used in our lives today.



### **Post Visit:**

#### Areas on a ship:

• Different words are used to describe the areas on a ship. Look at the photograph of the TACOMA vessel in *Appendix B*, and match the photographs to show the different areas and location of objects onboard.

#### Sleeping onboard:

• After seeing the accommodation area onboard the TACOMA imagine spending a night sleeping onboard. Use a 'y chart' to record what it would be like on a windy night.





### **Eating onboard:**

- Imagine you are onboard a FISHING vessel and have been given a list containing food items. They are to last you for one week:
- Make such a list

#### Fishermens food

- 1. Are there any foods you have never heard of before?
- 2. What are some of the meals you could make onboard?
- 3. How would you make this food last for a week?
- 4. Are all food groups included? Which are missing? Is this a balanced diet?

5. Think about ways food was treated and stored to stop it from rotting. How effective do you think these processes would have been?

6. How do you think this diet would affect your health and nutrition?

7. How is the food cooked

- Write a meal plan using the foods above to feed CREW for a day.
- TACOMA COOKIES

### Working Onboard:

- In the late 18th century and early 19th century Europeans fishermen explored the world, they searched sources of fish, whales seals and cod. The whales for oil, seals for fir and the cod for salting and trade. People of these vessels all had different roles and jobs. On a whale boat there was 35 crew, a tuna clipper 12 -22 Everyone on board a FISHING boat is expected to do their share of work to keep the boat running smoothly
- Fishing is not like a normal job or boat where watches are regular. If the fish are there the fishermen have to just grab what they can to eat in between fishing.
- Tacoma once caught 40 ton in 4.5 hours. if each fish weighed 20 kg and there were 3 teams of double polers fishing fish would sell for \$75 per ton

Numbers of fish total Catch rate / hour per minute /fish per no of seconds Value of catch price per ton Crews share 40% Conversion numbers of cans value in shop at 60% recovery

• Look at the list below and draw a line to match the people to their jobs:

People	Job
Captain	
Cook POLER 4	
ENGINEER POLER 5	
DECK BOSS POLER 6	
SPOTTER	
CHUMMER	
POLER 1	
POLER 2	
POLER 3	

#### • Imagine the following jobs need to be completed on board. Complete the table below:

Task	Why does it need doing?	What will you use?
Keep the floor of the deck clean		
MAKING NETS		
LOOKING AFTER THE BAIT		
RE FULING THE BOAT		

OPPERATING THE REFIGERATION	
Secure loose items during a storm	
Clean your bedding and sleeping area	

As a FISHERMAN you need to know how to tie knots. Each type of knot has a different purpose.
 Some of the commonly used knots are below. Use rope and learn how to tie a knot of your choice. You will know that you have mastered the knot when you can teach another person how to tie the same knot.



- Types of fishing gear
- Traps /pots
- Nets trawls /gill/ perse seine
- Hooks
- Harpoons
- Diving
- Dredges
- Fishing gear is very dangerous why
- Hooks winches ropes fish bight sting and infect health
- wash down keep boat clean smelly boat
- Bilge clean ice melting
- Brine slurry ice cream



## **Navigation: fish finding**

Early navigators used the time and the angle of the earth's tilt in relation to the sun to work out their location on the Earth's surface.

Ships captains and navigators used a chronometer to work out the longitude (time) and a sextant and tables to find the longitude (angle of the earth's tilt in relation to the sun).

• Look on a globe and identify lines of:

Longitude (east or west of the equator) Latitude (north or south of the equator)



• Cartography is the drawing and studying of charts and maps. Successful navigators had excellent cartography skills. Look at the charts in *Appendix C*.

1. The first chart was drawn by Matthew Flinders when he navigated the South Australian coast in 1802. Respond to the following questions:

Do you recognise some places that were named by Matthew Flinders?

Why do you think he gave places certain names?

Did the Aboriginal people name these places before Flinders?

2. Fishermen in small boats did not have this equipment .WHAT TOOLS DID THEY USE TO NAVIGATE

## **HOW FISH ARE FOUND**

list some of the ways the fishermen find fish .













### Glossary

- **Bow**: The front of a ship / vessel.
- **Stern:** The back of the boat
- Racks: platforms that the crew stand on to pole tuna
- Bait tank: tanks with circulating water to keep live bait
- scuppers: slots in the side of the boat to let water off the deck
- Stability:
- Crow's nest:
- Chart: A map used to navigate by sea or in the air.
- Galley: The kitchen area on a ship.
- Helm: A wheel or handle used for making a boat go in the direction you want.
- Lines: A length of rope that is in use, such as holding up a sail or an anchor line.
- **Deckhouse:** The crew bunk area.
- **Port**: The left hand side of a ship / vessel.
- **Provisions:** The supply of food or other necessities.
- **Rigging**: The ropes and chains used for supporting a ship's sails and masts
- Starboard: The right hand side of a ship / vessel.

- Fish Hold :
- Boom :
- Double block :
- Winch :
- Windlass:
- Squid:
- Lure :
- Gaff:
- Homeward bound :
- Cork line lead line :
- Perse line :
- Rippler :
- Birds types :
- Echo sounder :
- Engines main axilliary:
- Deck hose life raft:
- Gps:
- Eperb :
- Radios:
- Fishing equipment:.
- HEAD:
- Sheer:
- Lines plans



### <u>Crew</u>



The men who man and own the tuna boats and other fishing boats in port Lincoln are of many nationalities and come from all the Australian States . Whatever the nationality of the crew, the arrangement is the same. With few exceptions, all fish on shares. A typical crew comprises a captain, fishermen decky , engineer and a cook. The captain must have a skippers or masters ticket . With the ability he performs the navigation,

The fishermen are the "crew" of the vessel. When not fishing they stand a watch, take the wheel and perform the maintenance work on deck, in addition to repairing and assembling fishing gear. The engineer is a skilled and has an engineer's ticket . He is responsible for the satisfactory performance of all machinery and his task is arduous. On most of the larger boats he does no fishing; he has not the time. He nevertheless receives a full share and in some cases more, in recognition of his larger contribution to a successful trip. Many boats carry a skilled assistant engineer but in any event the engineer is assisted by three men picked from the crew. These men, except when actually fishing, stand regular engine room watches and perform the oiling and maintenance work below. Under the direction of the chief they assist in all mechanical repairs and servicing. Essentially they are fishermen, allotted the task of assisting in the engine room in place of sharing in the work on deck. Similarly the cook . gets a bigger share he is expected to fish whenever work permits. Whatever its composition may be, a successful crew must be capable of hard work when on the fishing grounds, which necessitates brawn and at times endurance. The successful boat is one whose machinery is efficiently operated and maintained: a boat manned by a willing crew and captained by one with fishing experience and judgment and the ability to handle boats and men.



### **Fishing History Port Lincoln**

- FISH TRAPS
- Whales
- Seals
- Oysters
- Whiting scale fish
- Tuna
- Prawns
- Pilchards
- Trawl fish
- Abalone
- Rock lobster
- Shark
- Aquaculture oysters abalone kingfish mussels
- Ranching tuna





## **APPENDIX A**



Whale boat



Oyster Boat





Tuna Boat



Shark Boat



Prawn Boats



Tacoma Tuna Shark Salmon Prawns

### ABOUT TUNA

Southern Blue fin tuna are able to reach speeds of 70 kilometres per hour when chasing prey. and travel up to 200 miles per day throught the water. Shoals of tuna migrate from spawning grounds in the Indian Ocean to grounds in colder southern waters. Females when they reach 8 years of age and 1.5 meters long produce several million eggs in one spawning The breeding season runs from September until March in the Java Sea and off the Kimberly coast. Tuna are opportunistic feeders migrate to the Southern coast of Australia until they reach around 5 years of age they then move waters between Cape town in the west and New Zealand to the

east . Southern Blue fin tuna live up to 40 years and reach 2.35 meters in length and weigh 200kg

During the 1960s, the annual catch of SBT was around 88,000 tonnes SBT has a high fat content and has been prized in Japan for 'sashimi' markets Development of – 60 c refrigeration aboard the Japanese long distant fishing increased supply. Fishing methods are purse seine netting in Australia and longline fishing by New Zealand,



#### Management

The Commission for the Conservation of the Southern Blue fin Tuna (CCSBT) was formed in 2001. The objective of the Commission is to ensure the conservation and optimum utilisation of the global Southern Blue fin tuna fishery Some scientists and conservationists are worried, however, that the Commission does not go far enough, and that global breeding stocks, having been reduced by as much as 97%. The current plan based on marine research is to rebuild the stock to 20% of its original parental bio mass. It is calculated that there is a 70% chance of reaching this goal by 2035 given current quota levels of 12,449t. Plus an Australian recreational catch of some 400t





## Appendix C



# Appendix D Fishing Gear Types

### Set gillnets

Set gillnets





### Characteristics

A set gillnet consists of a single netting wall kept more or less vertical by a float line and a weighted ground line. The net is set on the bottom, or at a certain distance above it and kept stationary by anchors or weights on both ends. Gillnets are of special interest for fisheries because it is a low cost fishery.

#### **Equipment needed**

Small solid floats, usually made of plastic and either cylindrical or egg-shaped, are attached to the headline and lead weights are evenly distributed along the ground line. The netting is made of multifilament nylon, monofilament or multi mono filament fibres to keep the visibility of the gear low. The size of fish caught is matched with the mesh size in the gillnet.

#### Handling Equipment

On small boats the gillnets are handled by hand. More common is the gear pulled by hydraulic driven

net haulers.

Net drums are also used for gillnets.

**Vessel Overview** Gillnetters. Boats engaged in gillnetting are equipped with net haulers.

Fish Operation The method of capture is by gilling.

**Target Species** Pelagic, demersal and benthic species. The size distribution of the catch is very much dependant on the mesh size used in the gillnet.

Water Area Overview Set gillnets are today widely used all over the world.

**Gear Environment** Set gillnets are employed in inland and sea waters. According to their design these nets may be used to fish in surface layers, in mid water or at the bottom

**Impacts Species** In general gillnets are fishing gears with a high degree of selectivity, regulated by the mesh size of the gear. Incidental catch of

of seabirds, , is a problem for gillnet fishers. "Ghost" fishing of lost gears is one of the major problems in the gillnet fishery. The synthetic fibres do not rot and the gear will fish for a long time. Fixing the floats to the netting with biodegradable material can reduce the problem.

**Costs** Gillnets are of special interests for fisheries because it is a low cost fishery. It is a gear with low energy consumption calculated on the relationship of fuel/fish

## **Fishing Vessel Types**

#### Trawlers





Deck Type Normally decked vessels

**Overview** Depending on the area of operation and trawl used, trawlers range in size from open boats, undecked, powered by outboard engines up to large ones

Trawling is the most important and one of the most efficient fishing methods in the world. Today, commercial trawling is carried out from very shallow waters up to a depth of 2000 m. These deep water vessels are provided with engines of power to tow the gear at the trawling speed.

three main types of trawlers can be distinguished:

the side trawler (Fig. 1),

the Stern trawlers (Fig. 2)

and the Outrigger trawlers (Fig. 3).

#### **Catch Handling and Processing Equipment**

Fresh fish in ice or refrigerated sea water and/or frozen fish in blocks or boxes.

**Equipment** Deck Equipment There will be various arrangements of the deck equipment depending on the type of trawler concerned. All trawlers will carry a

trawl winches for handling and storage of the towing warps.

Gilson winches,

net drums and other auxiliary winches are commonly installed to handle the gear and the catch. Pelagic trawlers may be equipped with fish pumps for emptying the codend.

Fish Detection Equipment Typical fish detection equipment of trawlers consists usually of a

sonar,

net sounder, various types of

echosounders and trawl control equipment.

Fishing Gear Bottom trawls, Midwater trawls.



### **Fishing Vessel Types Port Lincoln Fishing fleet**

### American seiners



#### Characteristics

Deck Type Decked vessels

**Overview** American seiners are most common on both coasts of North America and in many areas of Oceana and like all purse seiners are a most effective vessels for catching aggregating species near the surface. The vessel surrounds the shoal with a deep curtain of netting and than the bottom of the net is pursed (closed) underneath the shoal by hauling a wire which runs from the vessel through rings on the bottom of the net and back to the vessel. Searching for shoals and assessing the size and direction of movement of it are the most important part of the fishing operation. To assist in fish detection crows nests are sometimes arranged on masts and on large vessels observation towers and helicopter landing decks are provided. For improved manoeuvrability during fishing operations the vessels may be equipped with bow thrusters.

**Vessel Class Length** > 25 meters (LOA) **Power** > 350 Hp **Tonnage** > 50 GT (GRT in register tons)

**Deck Arrangement** These seiners have the bridge and accommodation placed forward with the working deck aft.

Catch Handling and Processing Equipment All.

**Equipment Deck Equipment** The power block is normally attached to a boom from a mast located directly behind the superstructure. A purse line winch will be located near the hauling station, usually on a preferred side amidships, where the rings are taken onboard. The net is stowed and carried at the stern of the vessel from which position the setting will take place.

Fish Detection Equipment Advanced electronic equipment such as different types of

#### echosounders,

sonar, and track plotters are used to: support the search for schools; assess the size and movement of the school; and to keep in touch with the school whilst surrounding it with the seine. Helicopters and spotter planes may also be employed for detecting fish schools.

**European** seiners

Fishing Gear Purse seines.



### Characteristics

Deck Type Decked vessels

**Overview** European seiners are most common in Scandinavia, the North Sea, Baltic and all waters fished by European nations and like all purse seiners are a most effective vessels for catching aggregating species near the surface. The vessel surrounds the shoal with a deep curtain of netting and than the bottom of the net is pursed (closed) underneath the shoal by hauling a wire which runs from the vessel through rings on the bottom of the net and back to the vessel. Searching for shoals and assessing the size and direction of movement of it are the most important part of the fishing operation. For improved manoeuvrability during fishing operations the vessels may be equipped with bow thrusters.

Vessel Class Length > 30 meters (LOA) Power > 350 Hp Tonnage > 60 GT (GRT in register tons)

**Deck Arrangement** This type of purse seiner has the bridge and accommodation located more to the after part of the vessel with the working deck amidships. The gear is carried and stowed in a net bin at the very aft part of the vessel. The net is set over the stern from this position. The pursing winch will normally be positioned at the forward part of the working deck.

Catch Handling and Processing Equipment fresh or RSW.

#### Equipment Deck Equipment For hauling the net a

triple roller (triplex) is used. Seine slide or tube and transport drums assist the transportation of the seine to the bin. The pursing winch is situated at the forepart of the vessel. Fish pumps are used for emptying the seine.

Fish Detection Equipment Advanced electronic equipment as, different types of

echosounders and

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sonars, and track plotters, support the search of shoals, assessing the size and movement of and keep in touch with the shoal whilst surrounding it with the seine.

Fishing Gear Purse seines

**Fishing Techniques** 

## Tuna Pole and Line Fishing



A pole and line consists of a hooked line attached to a pole.



**Handling Mode** The best is a light brine at about 0 °C, which prevents drying and damage by pressure. when the bait tanks are emptied they are cleaned and used as fish holds.

.Fishing Environment Pole and line fishing for tuna may occur almost everywhere, from the coast to the

high seas, depending on the tuna species, their migrations and the move of the water layers with the appropriate temperature. Western, Central and Southern Pacific Ocean, Western and Central Indian Ocean, Eastern Atlantic Ocean, Western Atlantic Ocean.

**Fishing Operations** The first step is aggregating the fish along the board of the vessel by using bait and/or water spraying. Then a number of men, equipped with fishing poles, position themselves on aft sidel and heave the fish aboard as they strike at the hooks. Pole and line fishing operation can be divided into the following main sequences:



1. Pole and line vessels carry live bait to entice the fish to aggregate around the boat by using bait and/or water spraying. Therefore, pole and line vessels start by catching live bait

#### sardines

anchovies type of small bait fish) in inshore waters using a small seine., proceed to the fishing grounds and begin to search for tunas. Considering the importance of keeping the bait alive on board, the vessel has special arrangement: the life bait is kept in a series of water tanks with circulating water temperature of which is controlled using water cooler and permanent lighting. Frozen bait can be used but the very strong preference of most pole fishermen is to use live bait which proved being more effective feeding tunas may not respond to dead bait and are often more voracious with live bait.

# School sighting and locating



**2.** Tuna schools can be located using different ways: by visual spotting (sea birds, or behaviour of fish species jumping, breezing, boiling, sea surface); by using acoustic instruments (

echosounder, etc.) or by using a jig line towed behind the boat.

#### Chumming of baitfish



**3.** Chumming is the scattering of live bait into the sea. The spray system is an important adjunct used in chumming and fishing. It gives the illusion that the water surface is alive with small fish causing the tuna to go into a feeding and biting frenzy. Once a school is sighted or located the chummer starts throwing live baits in every direction behind the vessel. At the same time, side and rear sprinklers are activated in order to create the illusion of a large school of small fish running near the surface. This illusion and the baits thrown continuously by the fisherman attract and concentrate the tuna school in the trail of the vessel. Small scoop nets are used to scoop the crowded bait out of the tank during the

fishing operation.

purse seiners makes an agreement with a pole and line vessel for encircling the tuna aggregated by chumming of baitfish (and the pole and line vessel) with its

purse seines. In this case, the actual fishing is not done by the pole and line but only by purse sein. Baitboat gets its share in terms of fish or money. Some pole and line boats only operate in this way throughout a trip with a contract with a seiner.

Catch and haul fish



**4.** Fishing can then start: the fishermen cast feathered jigs into the water and haul them back systematically a few seconds later. When fish are larger than 8-15 kg, double poling may be necessary. If a tuna is caught, the movements is prolonged and the tuna lands on the vessel's deck where it releases itself from the hook (because it is barbless). The line is then ready to be thrown again. During this activity, several tons of tuna can be fished in a few hours. However, if a fish falls back in the water or if the amount of thrown baits decreases, the school can run away from the vessel and the fishing ends as quickly as it started. Many Japanese pole and line vessels use robot fishing gears, which act very similar to the human in hooking fish. However, not all the fishermen can be replaced by robots.



Tuna preservation on board **5.** The tunas are then chilled as soon as possible after capture. Ice slurry is the most efficient cooling medium for rapid chilling of product.

**Fishery Overview** Tuna pole and lines is a fishing technique used all around the word from the following fleets: Ecuador, Mexico, Vanuatu, Japan, Rep. of Korea, Taiwan, Philippines, USA, China, Belize, Honduras, Indonesia, Australia, Panama, France, India, Iran, Sri Lanka, Maldives, Netherlands Antilles, Seychelles, Spain, Portugal, Ghana, Namibia, Senegal, South Africa, Morocco, Brazil, Venezuela, Uruguay.**Seasonality**Pole and line fishing is, in many areas, a seasonal activity. The season may change zone by zone according to the target species and its migration patterns. In Japan for example, the fishing season for albacore starts at the end of July (and for vessels, this new season is normally combined with skipjack fishing because the two species are generally found in the same areas).

