

Trawl – Gear description (fish & shrimp)

INSERT INSTRUCTOR Name




<http://www.safmc.net>




<http://www.slbnet.com>



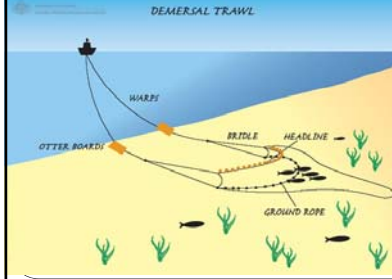
Joel Prado - FAO/FIIT



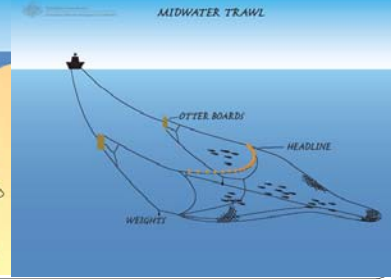
<http://www.ilvo.vlaanderen.be>



<http://www.seafood.org>



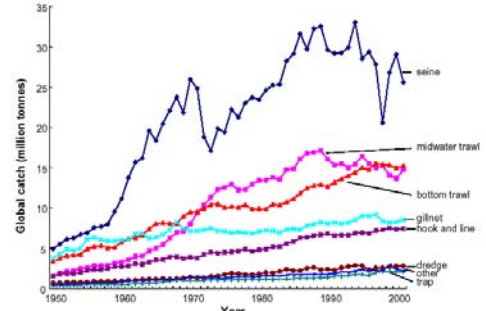
DEMERSAL TRAWL



MIDWATER TRAWL

Introduction

- Fish & invertebrates
- Bottom (demersal) and midwater (pelagic)
- ~ 50% global catch




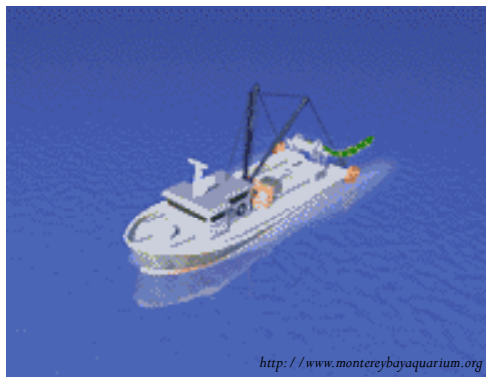
Global catch (million tonnes)

Year

Figure 1. Annual global catch (million tonnes) taken by general fishing gear types. Watson et al. 2004

Introduction

- Fish & invertebrates
- Bottom (demersal) and midwater (pelagic)
- 50% global catch
- Active
- Cone-shaped net

<http://www.montereybayaquarium.org>

<http://research.usm.maine.edu/>

Introduction

- Fish & invertebrates
- Bottom (demersal) and midwater (pelagic)
- 50% global catch
- Active using cone-shaped net
- Small & large vessels



Introduction - Impacts

- Bycatch
 - Juvenile fish in shrimp trawl
 - Protected species
- Bottom habitat

Shrimp fishing bycatch (Madagascar) <http://www.ird.fr/>



Before (top) & after (bottom) trawling. FAO 2005

Objectives

- Describe how trawl gear works
- List 4 components of a trawl and describe 2 pieces of specialized equipment
- Demonstrate ability to complete the gear description form

Sampling Priorities

1. Collect information on fishing effort
2. Randomly sample catch for catch composition
3. **Record gear characteristics**
4. Collect length-frequency data on target and non-target catch

Trawl configurations

- Varies by target & fish behavior
- Beam trawl / otter trawl / pair trawl

Trawl configurations

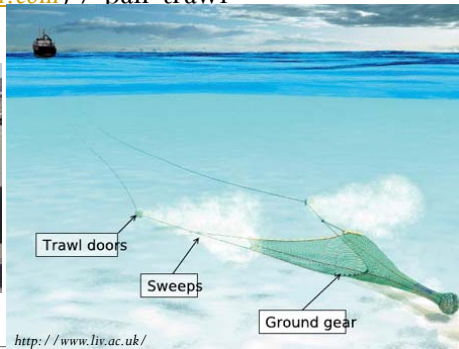
- Varies by target & fish behavior
- **Beam trawl** / otter trawl / pair trawl



<http://www.qc.dfo-mpo.gc.ca/>

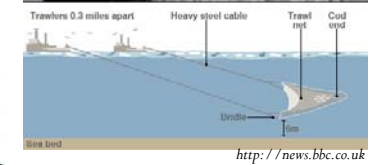
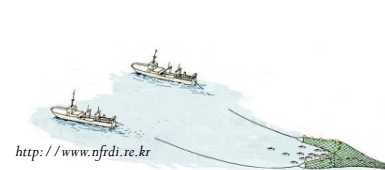
Trawl configurations

- Varies by target & fish behavior
- Beam trawl / **otter trawl** ([animation](http://www.dantrawl.com) from <http://www.dantrawl.com>) / pair trawl



Trawl configurations

- Varies by target & fish behavior
- Beam trawl/ otter trawl/ **pair trawl(2 vessels)**



Photos: <http://www.boatdesign.net/forums/open-discussion/beam-trawl-query-17413.html>

Trawl configurations

Images modified from FAO (2001b), Lokkeborg (2005) and <http://www.crimond.com>

Trawl configurations

- Confusing terminology (#1)
- Pair trawl – 2 vessels
<http://www.nfidi.re.kr>
- Twin trawl – 2 nets
<http://www.crimond.com/>
- Duplex (separator) trawl – 2 codends
<http://www.crimond.com/>

Trawl configurations

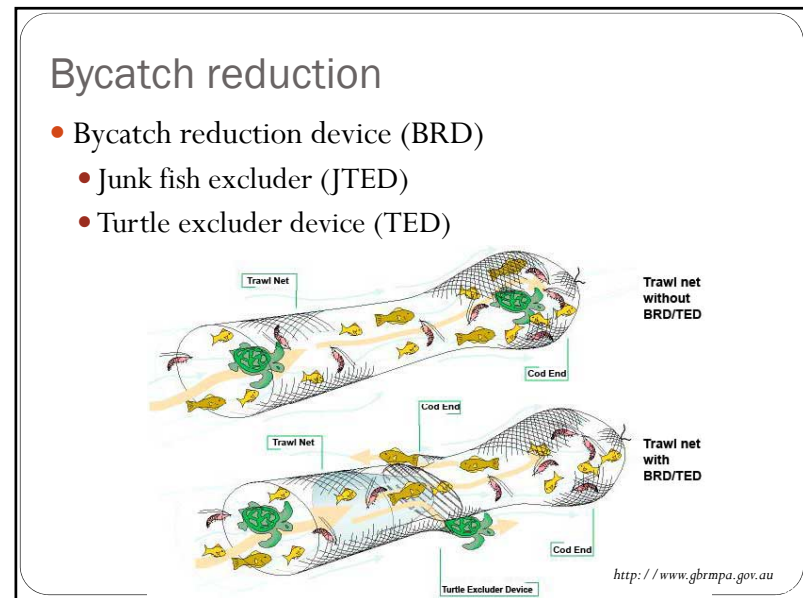
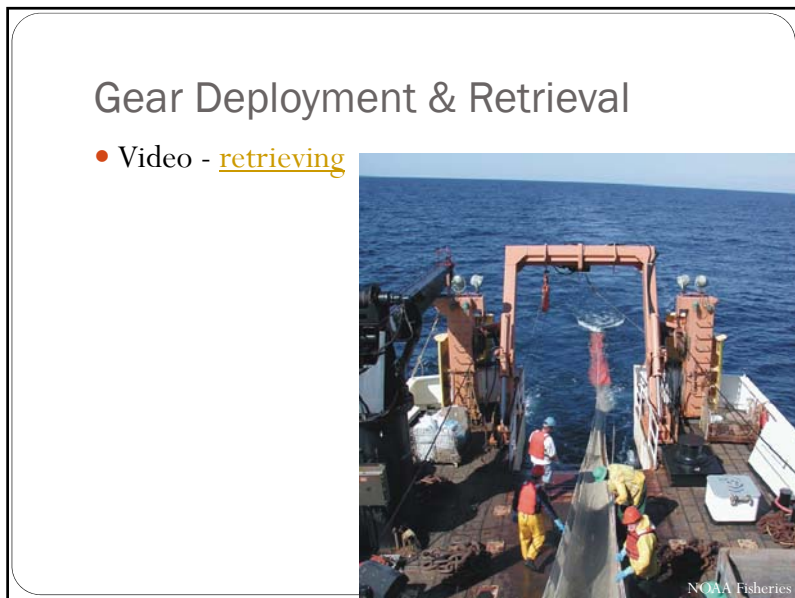
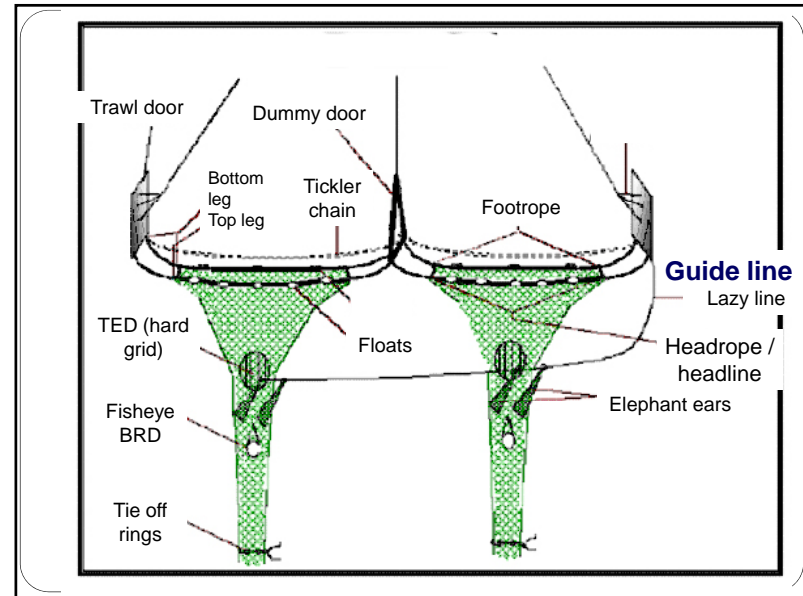
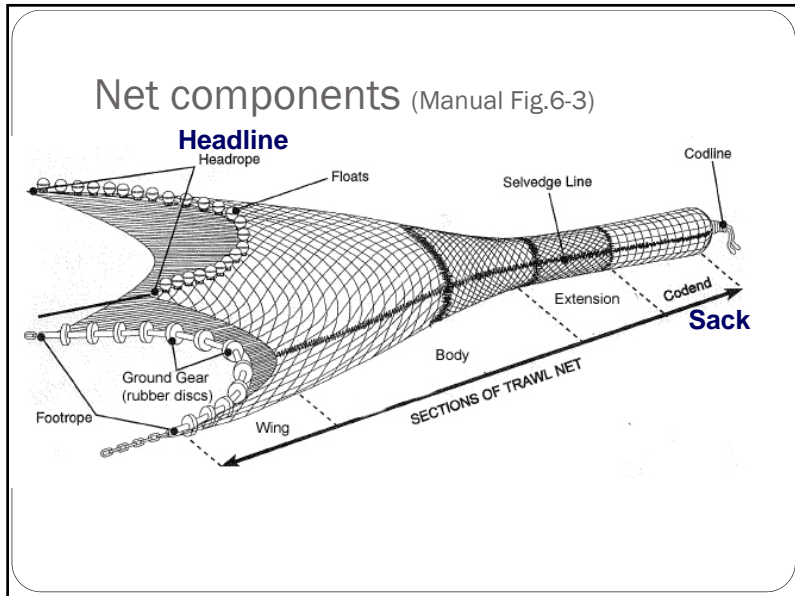
- Confusing terminology (#2)
- Beam trawler – vessels which deploy nets from abeam; also outrigger trawler or winch boat
- Beam trawl – type of net

Beam trawler with beam trawls;
<http://www.ilvo.vlaanderen.be>

Net components (Manual Fig.6-2)

A) Otter Trawl


B) Beam Trawl



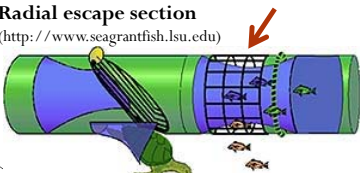
Bycatch reduction

- Bycatch reduction device (BRD)
 - Junk fish excluder (JTED)

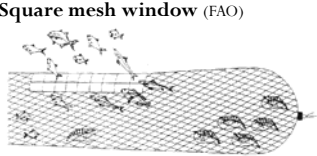
Fish eye (<http://www.seagrantfish.lsu.edu>)




Radial escape section (<http://www.seagrantfish.lsu.edu>)



Square mesh window (FAO)



Square mesh codend (<http://bayjournal.com.au>)



Bycatch reduction

- Bycatch reduction device (BRD)
 - Junk fish excluder (JTED)
 - Turtle excluder (TED [video](#))

Turtle Excluder Device

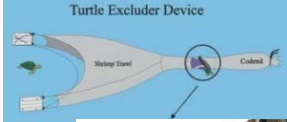

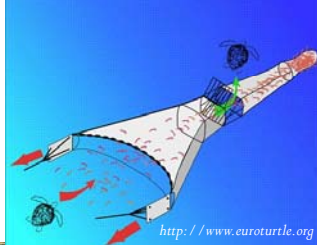



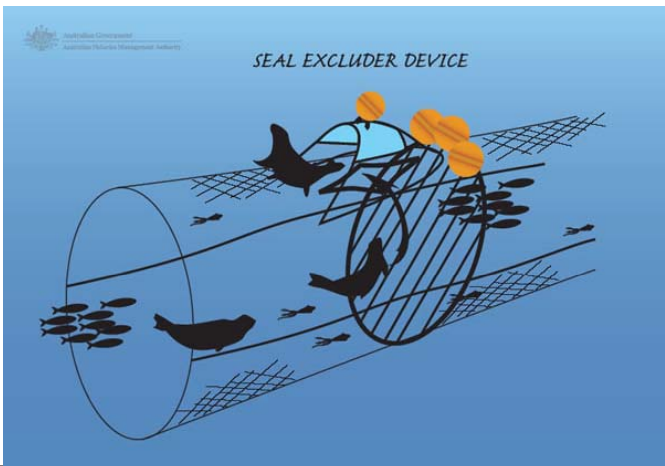
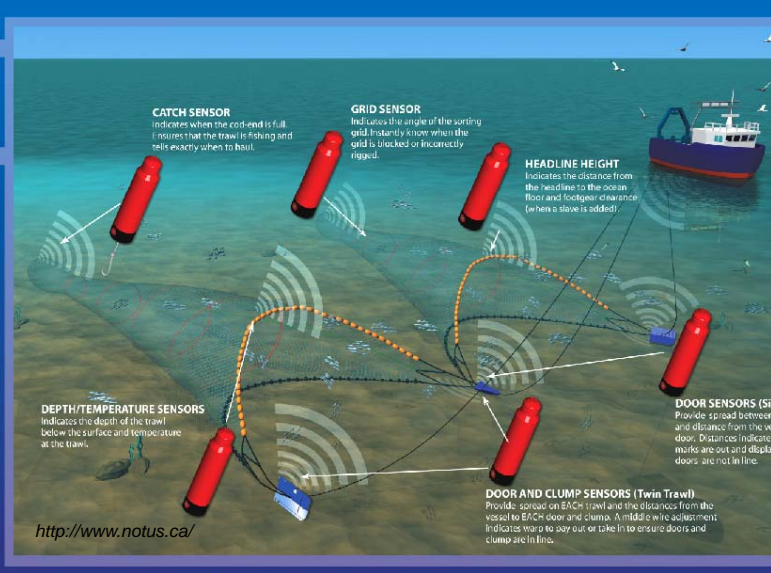
Photo: Mike Gerner, AFMA



<http://www.euroturtle.org>

Bycatch reduction

SEAL EXCLUDER DEVICE

CATCH SENSOR
Indicates when the cod-end is full. Ensures that the trawl is fishing and tells exactly when to haul.

GRID SENSOR
Indicates the angle of the sorting grid. Instantly know when the grid is blocked or incorrectly rigged.

HEADLINE HEIGHT
Indicates the distance from the headline to the ocean floor and footgear clearance (when a slope is added).

DEPTH/TEMPERATURE SENSORS
Indicates the depth of the trawl below the surface and temperature at the trawl.

DOOR SENSORS (Single Trawl)
Provide spread between the doors and distance from the vessel door. Distances indicate if the marks are out and display if doors are not in line.

DOOR AND CLUMP SENSORS (Twin Trawl)
Provide spread on EACH trawl and the distances from the vessel to EACH door and clump. A middle wire adjustment indicates when to pay out or take in to ensure doors and clump are in line.

<http://www.notus.ca/>

Trawlmaster provides the most important parameters of the trawl which allow you to fish more efficiently.

Gear Description - Finfish Trawl Page ____ of ____

Observer code	Vessel code	Trip ID	
Net type (check one): <input type="checkbox"/> Midwater <input type="checkbox"/> Bottom			Net #: 1
Configuration (check one): <input type="checkbox"/> Otter trawl <input type="checkbox"/> Beam trawl <input type="checkbox"/> Other			
Net deployment position: <input type="checkbox"/> Stern <input type="checkbox"/> Port <input type="checkbox"/> Stbd			
Net Manufacturer / design name:			
Otter Trawl			
Doors - Main		Doors - Dummy	
Material: Aluminum / Steel / Wood / Other		Material: Aluminum / Steel / Wood / Other	
Length (m)	Height (m)	Length (m)	Height (m)
Weight (kg)	Type Square / Oval / V / Other	Weight (kg)	Type Square / Oval / V / Other
Length (m)		Diameter (mm)	
Door legs - top		Material	
Door legs - bottom		Other	
Penant			
Groundline			
Bridle (top leg)			
Bridle (bottom leg)			

Gear Description - Finfish
Gear Description - Finfish Trawl Page ____ of ____

Observer code	Vessel code	Trip ID	
Net type (check one): <input type="checkbox"/> Midwater <input type="checkbox"/> Bottom			Net #:
Configuration (check one): <input checked="" type="checkbox"/> Otter trawl <input type="checkbox"/> Beam trawl <input type="checkbox"/> Other			
Net deployment position: <input type="checkbox"/> Stern <input type="checkbox"/> Port <input type="checkbox"/> Stbd			
Net Manufacturer / design name:			
Otter Trawl			
Doors - Main		Doors - Dummy	
Material: Aluminum / Steel / Wood / Other		Material: Aluminum / Steel / Wood / Other	
Length (m)	Height (m)	Length (m)	Height (m)
Weight (kg)	Type Square / Oval / V / Other	Weight (kg)	Type Square / Oval / V / Other
Length (m)		Diameter (mm)	
Door legs - top		Material	
Door legs - bottom		Other	
Penant			
Groundline			
Bridle (top leg)			



Observer code	Vessel code	Trip ID	
Net type (check one): <input type="checkbox"/> Midwater <input type="checkbox"/> Bottom			Net #:
Configuration (check one): <input type="checkbox"/> Otter trawl <input type="checkbox"/> Beam trawl <input type="checkbox"/> Other			
Net deployment position: <input type="checkbox"/> Stern <input type="checkbox"/> Port <input type="checkbox"/> Stbd			
Net Manufacturer / design name:			
Otter Trawl			
Doors - Main		Doors - Dummy	
Material: Aluminum / Steel / Wood / Other		Material: Aluminum / Steel / Wood / Other	
Length (m)	Height (m)	Length (m)	Height (m)
Weight (kg)	Type Square / Oval / V / Other	Weight (kg)	Type Square / Oval / V / Other
Length (m)		Diameter (mm)	
Door legs - top		Material	
Door legs - bottom		Other	
Penant			
Groundline			
Bridle (top leg)			
Bridle (bottom leg)			
Beam Trawl			
Length (m)		Weight (kg)	
Beam		Material	
		Other	

Beam Trawl				
	Length (m)	Weight (kg)	Material	Other
Beam				
Stake				

	Length (m)	Diameter (mm)	Material	Other
Bridle (main)				
Bridle (secondary-top)				
Bridle (secondary-bottom)				
Chain weight				Weight:

Otter and Beam Trawl				
	Length (m)	Diam (mm)	Material	Other
Warp / main wire				
3rd wire				
Headline Head rope				# floats:
Foot rope				
Selvedge line				
Tickler chain				Weight:
Other				

Gear Description - Finfish

Gear Description - Finfish Trawl Page ____ of ____

	Width (cm)	Diam (cm)	Material	Other
Metal bobbins				How many?
Metal spacers				How many?
Rubber discs				How many?
Rubber spacer				How many?
Other				

Gear Description - Finfish Trawl

Page ____ of ____

	Width (cm)	Diam (cm)	Material	Other
Metal bobbins				How many?
Metal spacers				How many?
Rubber discs				How many?
Rubber spacer				How many?
Other				

Net Characteristics						
Total length (m):	Mouth width:			Mouth height:		Other
Material	Diam. (mm)	Mesh open (cm)	W / D	# meshes long	# meshes around	
Wing						
Trawl body						
Extension						
Codend / sack						<input type="checkbox"/> <input type="checkbox"/>
Other						
Other						

Other rigging present? Check all that apply:

Chaffing gear Vert. Streng Strap Lazy line Other:
 Elephant cars Horiz. Streng Strap Other:
 Splitting Strap

Photos? Y / N

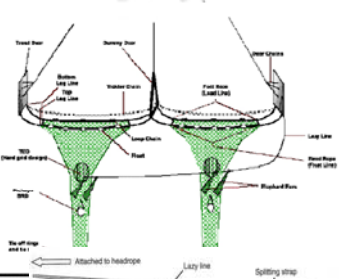

Bycatch Reduction Device (BRD)		
Type:	<input type="checkbox"/> Fisheye	<input type="checkbox"/> Square-mesh window
	<input type="checkbox"/> Radial escape section	<input type="checkbox"/> Square-mesh codend

Courtesy of S. Sei, Sierra Leone

Stretched Mesh Opening - Diamond Mesh

Finfish Trawl

Page ____ of ____

STRENGTHENING ROPES

Horizontal strengthening ropes are also referred to as lurcher ropes.

OTHER

Other rigging present? Check all that apply.

Chaffing gear Vert. Streng. Strap Lazy line Other:

Elephant ears Horiz. Streng. Strap Other:

Splitting Strap

Photos? Y / N

Gear Description - Finfish

Bycatch Reduction Device (BRD)

Type: Fisheye Square-mesh window Other:

Radial escape section Square-mesh codend

Funnel Yes Distance of escape opening from headrope: _____ m

No Distance of escape opening from tie off rings: _____ m

Fisheye Offset _____ Height _____

Opening (cm) Width _____ Height _____

Shape

Oval Diamond

Square Halfmoon

Rectangle Triangle

Other:

Radial escape section

Opening (cm) Width _____ Height _____

Length _____

If not all the way around, #openings _____

Square-mesh window

Opening (cm) Width _____ Height _____

BRD notes/drawing

Comments:

Gear Description - Finfish

Bycatch Reduction Device (BRD)

Type: Fisheye Square-mesh window Other:

Radial escape section Square-mesh codend

Funnel Yes Distance of escape opening from headrope: _____ m

No Distance of escape opening from tie off rings: _____ m

Fisheye Offset _____ Height _____

Opening (cm) Width _____ Height _____

Shape

Oval Diamond

Square Halfmoon

Rectangle Triangle

Other:

Radial escape section

Opening (cm) Width _____ Height _____


Length _____

If not all the way around, #openings _____

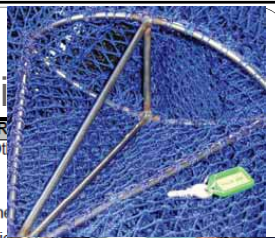
Square-mesh window

Opening (cm) Width _____ Height _____

BRD notes/drawing



Fish eye (<http://www.seagrantfish.lsu.edu>)



Images from Eayrs (2007)

Comments:

Gear Description - Finfish

Bycatch Reduction Device (BRD)

Type: Fisheye Square-mesh window Other:

Radial escape section Square-mesh codend

Funnel Yes Distance of escape opening from headrope: _____ m


No Distance of escape opening from tie off rings: _____ m

Radial escape section


Opening (cm) Width _____ Height _____

Length _____

If not all the way around, #openings _____



Radial Escape Section (<http://www.seagrantfish.lsu.edu>)



Images from Eayrs (2007)

Comments:

Gear Description - Finfish

Type: Fisheye **Bycatch Reduction Device**

Radial escape section Square-mesh window Square-mesh codend

Funnel Yes No

Distance of escape opening _____

Distance of escape opening _____

Fisheye Offset _____

Opening (cm) Width _____ Height _____

Radial escape Opening (cm) _____


If not all the same _____

Square-mesh window (highlighted)

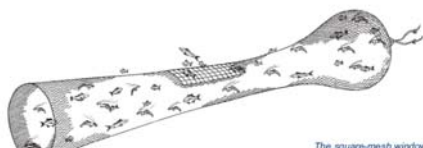
Opening (cm) Width _____ Height _____

BRD notes/drawing _____

Comments: _____



Images from Eavrs (200)



The square-mesh window

Gear Description - Shrimp Trawl

Page ____ of ____

Observer code _____

Vessel code _____

Trip ID _____

Total # nets: _____

Vessel configuration: Outrigger Stern trawler

Net # / position (check one or more if nets are identical; see manual for position diagram)

Port - outside (1) Stbd - inside (3) Try net (5)

Port - inside (2) Stbd - outside (4) Location: _____

Net Manufacturer / design name: _____

Material: _____

Length (m) _____

Weight (kg) _____

Bridle (cm) _____

Bottom _____

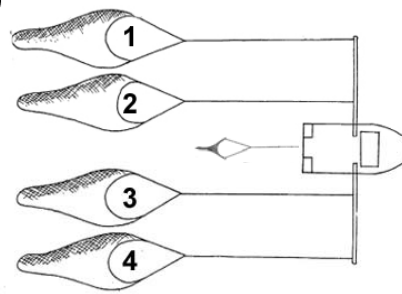
Top leg line _____

Bottom leg line _____

Warp _____

Foot rope _____

D)



my _____

eel / Wood / _____

(m) _____

Square / Oval / V _____

/ Other _____

Other

its: _____

Observer code _____

Vessel code _____

Trip ID _____

Total # nets: _____

Vessel configuration: Outrigger Stern trawler

Net # / position (check one or more if nets are identical; see manual for position diagram)

Port - outside (1) Stbd - inside (3) Try net (5)

Port - inside (2) Stbd - outside (4) Location: _____

Net Manufacturer / design name: _____

Doors - Main

Material: Aluminum / Steel / Wood / Other: _____

Length (m) _____

Width (m) _____

Weight (kg) _____

Type _____

Doors - Dummy

Material: Aluminum / Steel / Wood / Other: _____

Length (m) _____

Width (m) _____

Weight (kg) _____

Type _____

	Length (m)	Diameter (mm)	Material	Other
Bridle (door chain)				
Top leg line				
Bottom leg line				
Top leg line-dummy				
Bottom leg line - dummy				
Warp / Main wire				
Head rope				# floats: _____
Foot rope				
Tickler chain				Weight: _____
Loop chain				

Bottom leg line - dummy				
Warp / Main wire				
Head rope				# floats: _____
Foot rope				
Tickler chain				Weight: _____
Loop chain				

Net Characteristics

	Total length (m):	Mouth width:		Mouth height:			
	Material	Diameter (mm)	Mesh open (cm)	W / D	# meshes horiz	# meshes vert	Other
Wing			.				
Trawl body			.				
Extension			.				
Codend / sack			.				◇ / □
Other							
Other							

Other rigging present? Check all that apply.

Elephant ears Choke rings Lazy line Other: _____

Chafing gear Other: _____

Comments: _____

Gear Description - Shrimp Trawl Page ____ of ____

Bycatch Reduction Device (BRD)			
Type: <input type="checkbox"/> Fisheye <input type="checkbox"/> Square-mesh window <input type="checkbox"/> Other: _____ <input type="checkbox"/> Radial escape section <input type="checkbox"/> Square-mesh codend			
Funnel	<input type="checkbox"/> Yes	Distance of escape opening from headrope:	<input type="text"/> m
	<input type="checkbox"/> No	Distance of escape opening from tie off rings:	<input type="text"/> m
Fisheye		Radial escape section	
Opening (cm)	Width <input type="text"/> Height <input type="text"/>	Opening (cm)	Width <input type="text"/> Height <input type="text"/>
Shape <input type="checkbox"/> Oval <input type="checkbox"/> Diamond <input type="checkbox"/> Square <input type="checkbox"/> Halfmoon <input type="checkbox"/> Rectangle <input type="checkbox"/> Triangle <input type="checkbox"/> Other: _____		Length <input type="text"/> If not all the way around, #openings <input type="text"/>	
		Square-mesh window	
		Opening (cm)	Width <input type="text"/> Height <input type="text"/>
BRD notes/drawing			

Turtle Excluder Device (TED)

Turtle Excluder Device (TED)			
Name:		Type: Hard / Soft	
Opening: Top / Bottom	Funnel Yes / No	Flap Yes / No	
Material:		Shape Rectangle / Oval / Other:	
Angle (°):	Design: Curved bar / Straight bar / Other:		
Dimensions		Distance of TED from headrope: <input type="text"/> m	
Length: <input type="text"/> cm	# TED Floats:		
Width: <input type="text"/> cm	Float material Sponge / Foam / Plastic / Other:		
Bar Spacing: <input type="text"/> cm	Float shape Round / Cylinder / Bullet / Ellipsoid		
TED notes/drawing			

Trawl mouth ← → Codend

Grid length, Grid angle θ , Number of meshes x

Photos? Yes / No

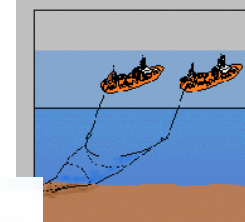
Version 1.2 8/2011

Activity

- Handout
- Groups of 2 or 3
- 20 minutes
- *use mini net in front of room for your codend mesh size.
Record your measurements and average mesh size calculation.

Summary

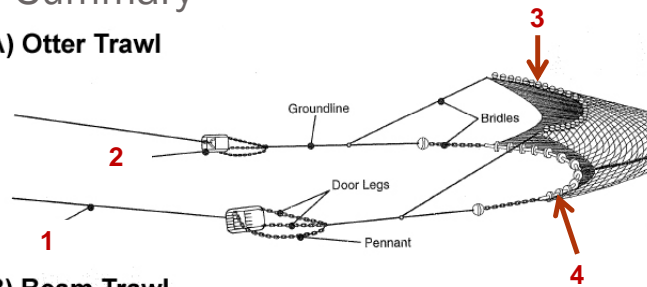
- Can you name the trawl configurations below



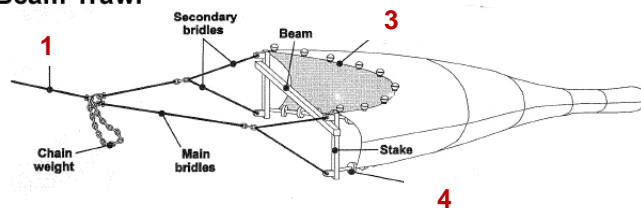
- Beam trawl / otter trawl / pair trawl

Summary

A) Otter Trawl



B) Beam Trawl



Summary

- Describe how trawl gear works

References

- Eayrs, S. 2007. A Guide to Bycatch Reduction in Tropical Shrimp-Trawl Fisheries. Revised edition. Rome, FAO. 108 p.
- Kelleher, K. 2005. Discards in the world's marine fisheries: An update. FAO Fisheries Technical Paper, FAO, Rome.
- Watson, R., E. Hoshino, J. Beblow, C. Revenga, Y. Kura, and A. Kitchingman. 2004. Fishing Gear Associated With Global Marine Catches. Fisheries Centre Research Reports 12.