

## **Fishery and Aquaculture**

### **Level-II**

**Based on July 2022, Version-1 Occupational standard**



**Module Title: - Performing Fishing**

**LG Code: AGR FAQ2 M01 LO (1-6) LG (1-6)**

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**Addis Ababa, Ethiopia**

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## Introduction to the Module

This module covers the knowledge, skills and attitude required to adjust and position fishing gears and catch fish from water body. Among all the first learning outcome requires understand biology and behavior of fish. Under this learning outcome many important contents are illustrated, such as basic information on anatomy and physiology of fish is identified and reproduction pattern of fish are understood, fish habitats and common species are understood and identified.

The second learning outcome is focused on prepare for fishing activities and the third assess and adjust fishing gears, position fish gears to optimize catch, collect the caught fish and the final learning outcome summarizes about how to complete fishing activities particularly; waste material produced during fishing; handled materials, tools and equipment and work outcomes and difficulties in completing work.

<b>LG #1</b>	<b>LO #1-Understand biology and behaviours of fish</b>
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<b>Instruction sheet</b>
<p>This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:</p> <ul style="list-style-type: none"> <li>• Identifying basic Anatomy and Physiology of fish</li> <li>• Understanding reproduction pattern of fish</li> <li>• Identifying and understanding fish habits and common species</li> </ul> <p>This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:</p> <ul style="list-style-type: none"> <li>• Basic Anatomy and Physiology of fish</li> <li>• Reproduction pattern of fish</li> <li>• Fish habits and common species</li> </ul>
<b>Learning Instructions:</b>
<ol style="list-style-type: none"> <li>1. Read the specific objectives of this Learning Guide.</li> <li>2. Follow the instructions described below.</li> <li>3. Read the information written in the information Sheets</li> <li>4. Accomplish the Self-checks</li> <li>5. Perform Operation Sheets</li> <li>6. Do the “LAP test”</li> </ol>

## Information Sheet 1

### 1.1 Identifying basic Anatomy and Physiology of fish

#### Terminologies

**Aquaculture** - is the controlled process of cultivating aquatic organisms, especially for human consumption

**Fish-** is an aquatic-vertebrate cold-blooded animal that breathes oxygen by means of gills, and moves and keep balance by fins, reproduce by laying eggs and its body covered by skin and scale.

**Fish farming (culture)** – is the large scale rearing or raising of fish in artificially prepared ponds and reservoirs on controlled and manageable manner for commercial purpose.

**Fish farming** is the intensive production of fish from artificially prepared ponds or reservoirs. Its main objective is to produce large amount of fish with a minimum cost so as to increase profitability of the business.

**Fresh water (Inland water)**-is a water contained in rivers, lakes, underground, rain water and streams.

#### 1.1.1 Fish anatomy

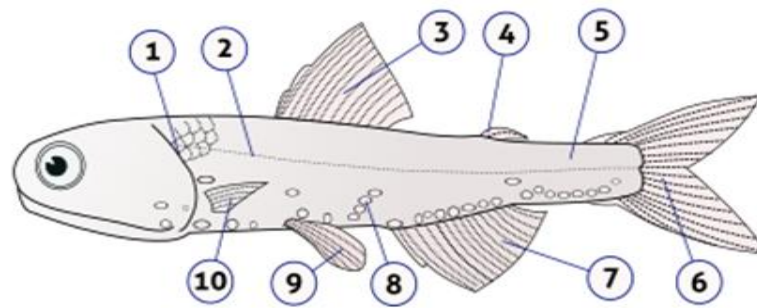
Fish anatomy is the study of the form or morphology of fish. It can be contrasted with fish physiology, which is the study of how the component parts of fish function together in the living fish. In practice, fish anatomy and fish physiology complement each other, the former dealing with the structure of a fish, its organs or component parts and how they are put together, such as might be observed on the dissecting table or under the microscope, and the latter dealing with how those components function together in living fish.

The anatomy of fish is often shaped by the physical characteristics of water, the medium in which fish live. Water is much denser than air, holds a relatively small amount of dissolved oxygen, and absorbs more light than air does.

The body of a fish is divided into a head, trunk/body and tail, although the divisions between the three are not always externally visible. The skeleton, which forms the support structure inside the fish, is either made of cartilage (cartilaginous fish) or bone (bony fish).

The main external features of the fish, the fins, are composed of either bony or soft spines called rays which, with the exception of the caudal fins, have no direct connection with the spine. They are supported by the muscles which compose the main part of the trunk. The heart has two chambers and pumps the blood through the respiratory surfaces of the gills and then around the body in a single circulatory loop.

The eyes are adapted for seeing underwater and have only local vision. There is an inner ear but no external or middle ear. Low frequency vibrations are detected by the lateral line system of sense organs that run along the length of the sides of fish, which responds to nearby movements and to changes in water pressure.



External anatomy of a bony fish (Hector's lanternfish):

- |                                  |                           |
|----------------------------------|---------------------------|
| 1. <u>Operculum</u> (gill cover) | 6. Caudal fin             |
| 2. Lateral line                  | 7. Anal fin               |
| 3. Dorsal fin                    | 8. Photophores            |
| 4. Adipose fin                   | 9. Pelvic fin (paired)    |
| 5. Caudal peduncle               | 10. Pectoral fin (paired) |

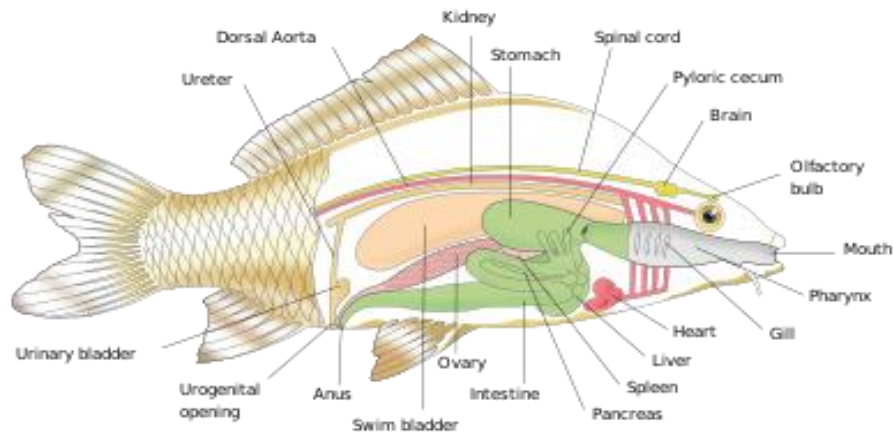
**Figure: 1.1 External anatomy of a bony fish**

<https://www.youtube.com/watch?v=nvhmg9l7PVw> /Accessed date 17/1/2023

### 1.1.2 Fish physiology

Fish physiology is the scientific study of how the component parts of fish function together in the living fish. It can be contrasted with fish anatomy, which is the study of the form or morphology of fishes. In practice, fish anatomy and physiology complement each other, the former dealing with the structure of a fish, its organs or component parts and how they are put together, such as might be observed on the dissecting table or under the microscope, and the later dealing with

how those components function together in the living fish. For this, at first we need to know about their intestinal morphology.



**1.2 Figure Internal anatomy of a bony fish**

<https://www.youtube.com/watch?v=FWX7fnh6oYo> /Accessed date 17/12/2023

## 1.2 Understanding reproduction pattern of fish

### 1.2.1 Introduction

In biology, reproduction is the process by which new individual organisms are produced. Reproduction is a fundamental feature of all known life; each individual organism exists as the result of reproduction. Reproductive processes can be classified into two main types: Sexual reproduction and asexual reproduction.

### 1.2.2 Reproduction in Fishes

The methods of reproduction in fishes are varied, but most fishes lay a large number of small eggs, fertilized and scattered outside of the body. The eggs of pelagic fishes usually remain suspended in the open water. Many shore and freshwater fishes lay eggs on the bottom or among plants. Some have adhesive eggs. The mortality of the young and especially of the eggs is very high, and often only a few individuals grow to maturity out of hundreds, thousands, and in some cases millions of eggs laid.



**Males** produce sperm, usually as a milky white substance called milt, in two (sometimes one) testes within the body cavity. In bony fishes a sperm duct leads from each testis to a urogenital opening behind the vent or anus. In sharks and rays and in cyclostomes the duct leads to a cloaca. In the **females** the eggs are formed in two ovaries (sometimes only one) and pass from the ovaries to the urogenital opening and to the outside. In some fishes the eggs are fertilized internally but shed before development takes place. Members of about a dozen families each of bony fishes (teleosts) and sharks bear live young. Many skates and rays also bear live young. In some bony fishes the eggs simply develop within the female, the young emerging when the eggs hatch (ovoviviparous).

Others develop within the ovary and are nourished by ovarian tissues after hatching (viviparous). There are also other methods utilized by fishes to nourish young within the female. In all live-bearers the young are born at a relatively large size and are few in number.

Some fishes are hermaphroditic, an individual producing both sperm and eggs, usually at different stages of its life. Self-fertilization, however, is probably rare.

Successful reproduction and in many cases defense of the eggs and young is assured by rather stereotyped but often elaborate courtship and parental behaviour, either by the male or the female or both. Some fishes prepare nests by hollowing out depressions in the sand bottom (cichlids, for example), build nests with plant materials and sticky threads excreted by the kidneys (sticklebacks), or blow a cluster of mucus-covered bubbles at the water surface (gouramis). The eggs are laid in these structures. Some varieties of cichlids and catfishes incubate eggs in their mouths.

- **Spawning** : spawning refers to the release of unfertilized planktonic eggs by female fish, which is the reproductive pattern for most marine fishes. The eggs are fertilized shortly after release by males. Some fishes also deposit unfertilized Fish Reproduction eggs in nests where they are fertilized and develop.

[https://www.youtube.com/watch?v=qnPJ3\\_0ZQRA](https://www.youtube.com/watch?v=qnPJ3_0ZQRA) Accessed date 17/1/2023

### 1.2.2.1 Types of reproduction

Generally two types of reproduction are seen, these are-

#### A. Sexual reproduction

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A form of reproduction that involves the fusion of two reproductive cells (ova and sperm) in the process of fertilization normally especially in animals, it requires two parents, one male and the other female. The female of the species produces an egg which is fertilized by sperm from the male. Depending on the species, fertilization takes place either within the female's body or externally, after the female lays her eggs and the male releases his sperm close by. When the egg is fertilized the genes of both parents are combined to produce zygote which develops into a new individual. Nearly all animals reproduce sexually.

## **B. Asexual reproduction**

Reproduction in which new individuals are produced from a single parent without the formation of gametes. Asexual reproduction enables animals to reproduce without a partner. It occurs chiefly in lower animals, microorganisms, and plants. Many invertebrates reproduce asexually, including coral and starfish. Coral grow small buds that break off to become separate organisms, whilst starfish are able to generate an entirely new being from a fragment of their original body.

### **1.2.2.2 Determining the sex of fish**

Figuring out the sex of a specific fish can be quite difficult if you don't know much about fish anatomy, but it's definitely doable. To figure out the sex of a fish, you'll have to observe the fish's size, shape, appearance, and behavior.

### **1.2.2.3 Compare the size of the fish during spawning season.**

With many fish, like koi, females tend to be larger than the males. This is especially true during spawning time, when females have large abdomens. To check the size of a fish in the same species, you can look at them when they're near each other, take a picture of each one, or catch one in a net to quickly use a ruler to measure its length and width.

- This is often caused by the fact that the female carries the eggs in her abdomen. Once the eggs are laid during spawning season, the females and males can return to the same size.
- If you catch a fish with a net to measure it, try to keep the fish in the water and place the ruler in the water to measure it. You will likely be able to get a general idea of the length and width.

#### 1.2.2.4 Looking for a bump on the forehead

To identify the male fish look carefully at the face of the fish just between the eyes and above the mouth. If it has a large, protruding bump, there's a good chance that the fish is a male. This bump is called a “nuchal hump,” and its present on many types of fish, like the tilapia, angelfish, oscar, and discus.

Some species of fish don't have a nuchal hump, but the presence of one is normally a great indicator that you have a male fish.

#### 1.2.2.5 Behavior shown by male during breeding period

- Body colour change
- Construct nest
- Chase female
- Tremble caudal fin to shed sperm

#### 1.2.2.6 Behavior shown by female during breeding period

- Enlargement of belly/abdomen
- Rub the body against stone or aquatic vegetation
- Jump highly from the water to spawn/lay eggs
- Stay in nest or hole or cave silently for a long time without feeding

<https://www.youtube.com/watch?v=4QWfdbquowA> Accessed date 17/1/2023

### 1.3 Identifying and understanding fish habits and common species

#### • Fish behavior

Fish behavior is a complicated and varied subject. Fishes live in virtually all aquatic habitats. Different species of fish are adapted for different habitats: rocky shores, coral reefs, kelp forests, rivers and streams, lakes and ponds, under sea ice, the deep sea, and other environments of fresh, salt, and brackish water.

As in almost all animals with a central nervous system, the nature of a response of an individual fish to stimuli from its environment depends upon the inherited characteristics of its nervous system, on what it has learned from past experience, and on the nature of the stimuli.

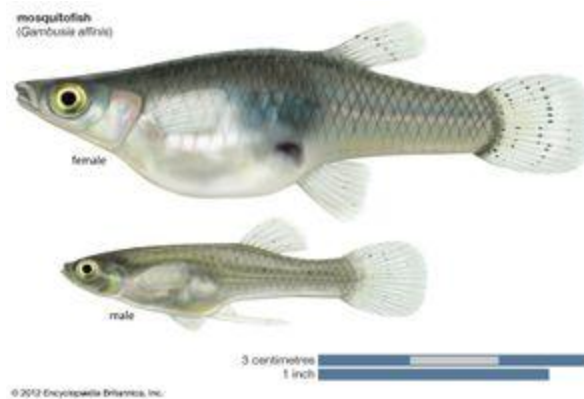
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Fishes perceive the world around them by the usual senses of sight, smell, hearing, touch, and taste and by special lateral line water-current detectors. In the few fishes that generate electric fields, a process that might best be called electro location aids in perception. One or another of these senses often is emphasized at the expense of others, depending upon the fish's other adaptations. In fishes with large eyes, the sense of smell may be reduced; others, with small eyes, hunt and feed primarily by smell.

Specialized behaviour is primarily concerned with the three most important activities in the fish's life: feeding, reproduction, and escape from enemies.

Communication between members of a species or between members of two or more species often is extremely important, especially in breeding behaviour. The mode of communication may be visual, as between the small so-called cleaner fish and a large fish of a very different species.

Many fishes have a streamlined body and swim freely in open water. Fish locomotion is closely correlated with habitat and ecological niche (the general position of the animal to its environment).



**Figure 1.3: Mosquitofish (*Gambusia affinis*)**

### 1.3.1 Common types of fish species

Fish are found in almost every marine environment, from the deepest ocean trenches to mountain streams high above the sea level. They have been used as a major source of food since the beginning of recorded history.

Traditionally, extant fish species are divided into three classes. These are

- I. Agnatha (jawless fish),
- II. Osteichthyes (boneless fish), and
- III. Chondrichthyes (cartilaginous).

About 33,600 different species of fish are known. No other vertebrate group show such species diversity. However, a far more detailed scheme also exists.

#### A. Salmon

Salmon is a member of the family Salmonidae. There are about nine species of salmon, all of which come from two different genera. Few other fish species are called salmon in different parts of the world but are not salmon (for example, Australian salmon and Hawaiian salmon). Today, salmon species are farmed extensively in different regions of the world but they are native to the Atlantic and Pacific oceans. Most of the salmon species are anadromous; a migration pattern in which fish migrate from ocean up onto freshwater to hatch or spawn.



**Figure 1.4: salmon fish**

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## B. Trout

Family: Salmonidae

Trout is a common name used to acknowledge a wide number of freshwater fish species that belong to three different genera; namely *Salmo* and *Salvelinus*, and *Oncorhynchus*.

Patterns and coloration on trouts can vary based on their immediate environment, and many of its species exhibits intense coloration when they are about to breed. Apart from a few, all trout species are morphologically different from each other but show no signs of major genetic differences. Lake trout, which is widely popular in North America, can weigh more than 30 kg.



**Figure 1.5: Trout fish**

## C. Nile Tilapia

**Scientific Name:** *Oreochromis niloticus*

Nile tilapia is among the most important food fishes in the world. The species is native to northern Africa, though populations of Nile tilapia have been introduced in various other parts of the world. A Nile tilapia averages about 60 cm in length and rarely exceeds 5 kg in weight.

It appears, from various paintings, that the species was well known to the Ancient Egyptians. Nile tilapias are highly social. They even exhibit social hierarchies, where males are more dominant and usually have control over mating and food.

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**Figure 1.6: Tilapiafish**

#### **D. Basa**

**Scientific Name:** Pangasius bocourti

Basa is a widely consumed (by humans) fish species found mostly in mainland Southeast Asia. Regionally, the species is known by different names. In the UK, they are popularly known as “river cobbler”, while in Australia, they are called basa fish or swai.

In North America, the basa (from its native region) is mostly avoided. Environmental Research organizations like OceanWise, a part of the Vancouver Aquarium, have raised concerns about the potentially negative impact of basa on its immediate environment.



**Figure 1.7: Baza fish**

## E. Common carp

**Scientific Name:** Cyprinus carpio

The common carp is a popular type of fish, used both as a food and in sport. Though common carp is native to Asia and Europe, it has been successfully introduced in other regions of the world.

There is a striking difference in shape and size between domesticated and wild common carp. The domesticated ones tend to be bulky and larger sometimes as much as 4 times the wild common carps. The largest known specimen of the species weighed around 45 kg.

In a year, a single female common carp can lay close to one million eggs but only a few survive as they fall victim to a wide range of fungal and bacterial infections. Common carp are known to interbreed with goldfish.

Despite its popularity as fish food, the common carp is recognized as a pest in some parts of the world due to its highly destructive and invasive nature. In Australia, authorities are working on a few methods that would restrict their explosively growing population.



**Figure 1.8: Common carp**

## F. Neon Tetra

**ScientificName:** Paracheirodoninnesi

**Lifespan:** 5-10 Years

The neon tetra is a popular aquarium fish, known for its vibrant color pattern. They are native to both clearwater and blackwater streams in the Amazon basin but are also available in various



Southeast Asian countries where they are farm-grown. The maximum length of a neon tetra is about 3.5 cm.

The species can be easily distinguished by two iridescent horizontal stripes on each side. The first is a shiny blue stripe that extends from its eye to adipose fin. The second one is a thick red stripe that originates from the middle of the body and ends near the back of its tail. These iridescent stripes become dull or grey at night.



Figure 1.9: Neon tetra fish

### G. Atlantic Mackerel

**Scientific Name:** Scomber scombrus

The Atlantic mackerel is known by many names such as Scottish mackerel, Boston mackerel or just mackerel. They are commonly found in temperate waters of the North Atlantic ocean. A mature Atlantic mackerel can grow up to 30 cm in length, however, the largest spotted specimen was about 60 cm long.

During a spawning season, a female Atlantic mackerel can produce as much as 450,000 eggs. Every year, about one million tonnes of Atlantic mackerel are caught by fisheries.

One of the reasons why the species is in such high demand is because it is extremely rich in vital nutrients such as vitamin b, selenium, and Omega 3 fatty acid.



**Figure1.10 Atlantic Mackerel**

## **H. Atlantic Cod**

**ScientificName:**Gadusmorhua

Lifespan: 25 Years

The Atlantic cod, or simply cod, is among the most consumed fish (by humans) in the world. They are found on both sides North Atlantic Ocean as well as parts of the Arctic Ocean including the North Sea and Baltic Sea.

The species can be recognized by a notable white stripe that runs along its lateral line and dark spots on the upper body. An average Atlantic cod measures about 1.2 meters in length and 40 kg in weight. The largest known cod on record, however, weighed about 96 kg.

The Atlantic cod population registered a steep decline in the 1990s, due to its overfishing in the latter half of the 20th century, and it is still unable to fully recover.



**Figure 1.11 Atlantic Cod**

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## J. Sword fish

**Scientific Name:** Xiphias gladius

**Lifespan:** 9 Years

Swordfish are recognized by their long, pointed beak or bill (rostrum). As a migrant species, swordfish are widely found in tropical as well as temperate regions of the world. They are known for their speed and agility, which allows them to catch prey more efficiently.

The largest swordfish, on record, measures about 4.5 meters in length and 650 kg in weight.

Like few shark species, swordfish depends on the environment to regulate their body temperature. A specialized heating organ helps them raise the temperature to 15 degrees in tissues located around their eyes. Out of 25,000 species of bony fishes, Swordfish is one of the only 22 species that possess such heating mechanism.



**Figure 1.12: Sword fish**

## K. Wels cat fish

**Scientific Name:** Silurus glanis

**Lifespan:** 50 Years

Wels catfish, sometimes called sheatfish, is one of the extant species of catfish found in slow-flowing rivers and lakes around the Eurasian region. A small number of wels catfish live in Chernobyl's long-abandoned cooling ponds. Surprisingly, they appear to be somehow unaffected by radiation.

At its full extent, a wels catfish can measure up to 5 m in length and 300 kg in weight. It is the largest freshwater fish found in Eurasia. Large wels catfish (above 15 kg) are a popular target for sport fishing due to their aggressive nature.

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**Figure 1.13: Wels cat fish**

## **L. Gold fish**

**Scientific Name:** *Carassius auratus*

The goldfish is perhaps the most common aquarium fish in the world. If you have or ever had an aquarium, there is a big chance that you kept a goldfish as a pet.

Based on bodily characteristics and coloring, goldfish can be classified into 300 varieties. Most of the well-known goldfish varieties originated from China, where they were selectively bred for the first time about 1,000 years ago.

*Carassius auratus* is also one of the most well studied freshwater fish species. Multiple research has shown that goldfish have powerful cognitive and learning abilities. In one such study, researchers found that goldfish can differentiate between different colors and shapes. They also have a memory span of three months.



**Figure 1.14: Gold fish**

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## M. Siamese fish

**ScientificName:** Bettasplendens

**Conservation Status:** Vulnerable

The Siamese fighting fish, commonly known as the betta, is a common sight in aquariums around the world. Though betta specimens in aquariums often exhibit vibrant colors, they are usually dull brown and grey in appearance. On average, a Betta measures about 6.5 cm in length. Bettas are territorially aggressive species. Both male and female bettas show a high level of aggression against each other, especially when confined to a small area. The species is native to Mainland Southeast Asian countries including, Thailand, Laos, Cambodia, and Vietnam.



**Figure 1.15: Siamese fish**



**Table: 1.1 Common fish species in Ethiopia**

No.	Scientific Name	Common Name	Local Name
1	Lates niloticus	Nile perch	Nech asa
2	Oreochromis niloticus	Nile tilapia	Qoroso
3	Barbus species	Barbus	bilicha
4	Labeo species	Labeo	Barbo/Lebi
5	Clarias garipienus	Cat fish	Ambaza
6	Bagrus docmac	Bagrus	Kerkero
7	Polypterus bichir	Nile bichir	Eguwella
8	Gmnarchus niloticus	Gymnarchus	Wit
9	malapterurus	Malapterurus	-
10	Crussian carp	Carp	Daba
11	Distichodus niloticus	Distichodus	Piro
12	Hydrocynus forskali	Hydrocynus	Weri
13	Heteroticus niloticus	Heteroticus	Ediwela
14	Citharinus	Citharinus	Ajaka
15	Synodontis species	Synodontis	Akoko

Self-check- 1	Written test
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Name..... ID..... Date.....

**Directions:** Answer all the questions listed below.

**Test I: Multiple choices**

- One of the following is refers to is the study of the form or morphology of fish;
  - Physiology of fish
  - Anatomy of fish
  - Behaviors of fish
  - Species of fish
- One of the following species of fish is among the most important food fishes in the and native to northern Africa;
  - Gold fish
  - Atlantic cold fish
  - Nile tilapia fish
  - Salmon

**Test II: Short Answer Questions**

- What are the common behaviors of fish that distinguish from other animal species?
- List the common types of fish species?
- How do you determining the sex of fish?



## LG #2

## LO #2- Prepare for fishing activities

### Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identifying and organizing, fish tools, Equipments and materials
- Applying occupational health and safety(OHS)procedure
- Identifying unsafe and inefficient working area
- Providing clear instruction of cover task and methods
- Applying fishing techniques

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify and organize, fish tools, Equipments and materials
- Apply occupational health and safety(OHS)procedure
- Identify unsafe and inefficient working area
- Provide clear instruction of cover task and methods
- Apply fishing techniques

### Learning Instructions:



1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”






## Information Sheet -2


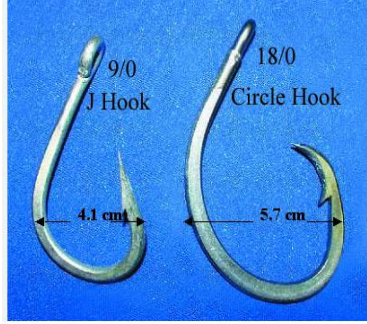


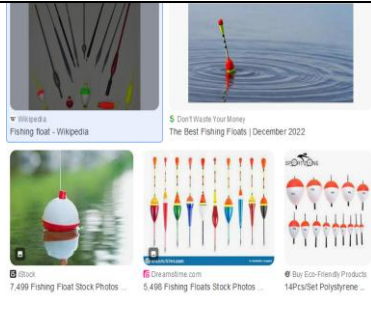
### 2.1 Identifying and organizing, fish tools, Equipments and materials

Fish farming require some essential materials, tools, equipment and facilities which are used for varies purposes. Such equipment may be used for maintenance and repairs, harvesting the fish, monitoring and maintaining water quality, packaging stock, excluding predators and pests, and other miscellaneous facilities for maximizing the use of various inputs.






**Table: 2.1 The tools, Equipments and materials of fishery activities**

No.	Names of tools and equipments	Definition and functions of tools and equipments	Figure
1	Water pump	<p>This will help the farmer to pump in water to the ponds and also pump out water when due.</p> <p>In a fish farm, there are two commonly used types of pond pumps which are;</p> <ul style="list-style-type: none"> <li>Centrifugal: These pumps should be horizontally presented through the outer boundary of the pond</li> <li>Turbine: The ones is to be presented horizontally.</li> </ul>	
2	Seine Reels	<p>The seine reels play a vital role in the fish farm when the fish are ripe for harvesting. During the harvesting period of your fish, the seine will help to collect the fish from the water by sinking down to the bottom of the pond. The seine works perfectly with the help of a tractor.</p>	

3	Fish Feeding Machine	With the feeding machine, the farmer will easily release feed into the pond at regular intervals. Also, as a farmer, you can buy grinders, mixers, pellet-making machines, etc, they will help you to produce your own fish feeds if you so desire.	
4	Buckets and Tubs	In fish farming, when stocking fishes into the ponds, the Buckets and Tubs are categorized under “Stocking Equipments”. The tools are to be let down into water gradually so that the fish can swim into the water.	
5	Aerators/Air Pump	The function of the aerators/air pump is that it will help increase the level of dissolved oxygen inside the pond, therefore creating spaces for more fishes to occupy in that same pond.  This act is a call for action especially when the water in the pond is still.	
6	Weighing scale	The weighing scale is used by the fish farmer to know if the fishes are gaining or losing weight. After the weighing process, if the fish are gaining weight, that means they are healthy growing, but on the contrary, if they are losing it, that simply means they are not on track.	
7	Fishing swivel	A fishing swivel is a small, usually ball- or barrel-shaped device used in angling to connect sections of fishing lines, consisting of two rings linked via a thrust bearing pivot joint.	

8	Thermometer	<p>This device is used in measuring temperature.</p> <p>Yes, the importance of a thermometer in a fish farm is mainly to keep an eye on the temperature of the water</p>	
9	Fish hook	<p>Fish hook formerly also called angle (from Old English <i>angol</i> and Proto-Germanic <i>*angulaz</i>), is a hook used to catch fish either by piercing and embedding onto the inside of the fish mouth (angling) or, more rarely, by impaling and snagging the external fish body.</p>	
10	Fishing bite	<p>it is any substance used to attract and catch fish, e.g. on a fishing hook. Bait items are both selected from and placed within the environment to achieve enhanced prey capture success. Traditionally, fishing baits are natural fish food such as night-crawlers, insects, worms, and smaller bait fish that have been used for catching fish.</p>	
11	Fishing lures	<p>Fishing lures are small, artificial objects often shaped like a fish's prey that are attached to a hook and tied to the end of a fishing line. They are used to attract fish to your line. There are many different types of lures on the market such as jigs, spinners, spoons, fly lures, crank baits, and plugs</p>	
12	Floter	<p>A fishing float or bobber is a lightweight buoy used in angling, usually attached to a fishing line. A float can serve several purposes:</p> <ul style="list-style-type: none"> <li>• It serves as a visual bite indicator that helps the angler assess underwater status of the baited hook and decide whether to start retrieving the line;</li> <li>• It can suspend the hook and bait at a</li> </ul>	



		predetermined depth, which helps the angler target specific fishes;	
13	Fishing net	Nets are devices made from fibers woven in a grid-like structure. Some fishing nets are also called fish traps, for example fyke nets. Fishing nets are usually meshes formed by knotting a relatively thin thread.	
14	Fishing sinker or Knoch	A fishing sinker or knoch is a weight used in conjunction with a fishing lure or hook to increase its rate of sink, anchoring ability, and/or casting distance. Fishing sinkers may be as small as 1 gram for applications in shallow water, and even smaller for fly fishing applications, or as large as several pounds or considerably more for deep sea fishing.	
15	Fish holding cradle	Water releasing muskies is probably the ultimate releasing methods, but if fish are hooked, badly or if you want weigh and photograph larger fish, cradling is defiantly the least stressful landing method.	
16	Measuring board	The Scielex Measuring Board is designed to assist with the measurement of fish. The Measuring Board provides a fast and efficient method for transferring fish length, together with other information to almost any digital device.	
17	Needle nose pliers	Needle nose pliers usually have some teeth on their jaws to help grip the fly, and the handles will help you ease out the hook.	

Not only the above table, materials, tools and equipments of fishery activities listed as the following info graphics. these are ;

- **Fishing reel**

Fishing reel is a hand-cranked reel used in angling to wind and stow fishing line, typical mounted onto a fishing rod, but may also be used to retrieve a tethered arrow when bow fishing



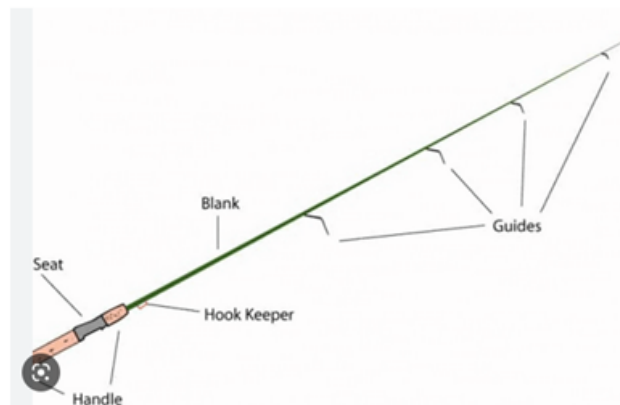
Info graph: 2.1 parts of fish reel

- **Fishing rods**

Fishing rod is a long pole made of wood, plastic, etc. with a line attached to it and a hook at the end of the line, used for catching fish

Types of Fishing Rods Explained

- Spin Fishing Rod.
- Spincast / Casting Rod.
- Telescoping Fishing Rod.
- Fly Fishing Rod.
- Ultralight Fishing Rod.
- Surf Fishing Rod.
- Trolling Fishing Rod.



Info graph: 2.2 fishing rods

- **Fishing containers**

Containers is a vivarium of any size having at least one transparent side in which aquatic plants or animals are | kept and displayed. Fish keepers use aquaria to keep fish, invertebrates, amphibians, aquatic reptiles, such as turtles, and aquatic plants.



**Info graph: 2.3 Fishing container**

- **Fishing Boat**

A fishing vessel is a boat or ship used to catch fish in the sea, or on a lake or river.

Many different kinds of vessels are used in commercial, artisanal and recreational fishing.



**Info graph: 2.4 Fishing boat**

- **Dissolved oxygen meter**

A dissolved oxygen meter is used to measure the level of dissolved oxygen in water.

It consists of a probe and a meter.

The probe is lowered into water and gently moved from side to side, and then a reading is taken from the meter.



**Info graph: 2.5 Oxy meter**



- **PH meter**

A pH meter is used to measure the *pH* in water. It consists of a probe and a meter. The probe is lowered into the water sample and the pH of the sample will be displayed on the meter



**Info graph: 2.6 Fishing PH meter**

- **Salinity meter**

A salinity meter is used to measure the salinity of water. A salinity meter has a probe that detects the salinity of a water sample, and a meter that displays the salinity of the water in parts per thousand.



**Info graph: 2.7 Fishing salinity meter**

- **Secchi disk**

The secchi disk is basically a painted disk attached to a length of cord, or a rod. It is used to measure the turbidity of water. The cord or rod is often graduated so that the depth the disk has sunk to can be measured.



**Info graph: 2.8 Secchi disk**

- **Generators**

Generators are used as a backup to the farm power supply system. The reason why you need generators in your fish farm is that failures in the power supply system automatically lead to aeration systems fail which is not good for the fishes. Especially the ones that are in a crowded tank.

- **Strings, Pegs, and Measuring Tape**

These tools are categorized under “Measuring Equipment” and they all perform different functions in the fish farm.

- ✓ **Strings:** Use it across the pond for security purposes.
- ✓ **Pegs:** In building a fish pond, wooden pegs can be used to demarcate the borders of the rectangle. Also, they can be joined together using the string to act as a barrier to predators as well.
- ✓ **Measuring Tape:** A measuring tape will be used in deciding the length and width of the fish pond during the fish pond build process, after the site has been chosen by the farmer where the pond will be located, and the pond dimensions set out.

- **Handling and Grading Equipment**







During the harvesting period of the fishes, make sure that they are grade by size.





Is there any part of this content that you need more clarity on? or maybe you are a fish farmer and have a profitable idea to contribute to this, kindly use the comment section below to send us your feedback.

## 2.2 Applying occupational health and safety(OHS)procedure

Many workers in the Agriculture and Fishing industry get injured every year because they fail to observe correct workplace health and safety procedures. This topic provides information to help you keep your work place free from injury.

**Table: 2.2 Occupational health and safety (OHS)**

Sign	Description	Examples
	<b>Explosives</b> are materials that have very fast chemical reactions. They release large quantities of gas in the form of an explosion.	Ammunition, fireworks, and flares.
	<b>Flammable gases</b> can burn when they come into contact with oxygen or a source of heat. In some conditions they can even explode! Since these gases can burn they cause other normally non-hazardous materials to burn.	Methane, acetylene, and propane.
	<b>Non-flammable and non-toxic</b> gases are non-flammable and non-poisonous.	Nitrogen, oxygen and medical air.
	Also called poison gases, <b>toxic gases</b> are dangerous because they can mix with air and can easily enter the lungs to make you very sick or even kill you. Some poison gases can also be absorbed through the skin.	Carbonmonoxide, chlorine, ammonia, and hydrogen sulphide.
	<b>Flammable liquids</b> are liquids that can burn. Once flammable liquids burn, they can cause other substances to burn.	alcohols, methylated spirits and solvents.
	<b>Flammable solids</b> burn very easily. All it takes is a bit of exposure to a heat source. Even friction can cause these solids to burn. Flammable solids come in powdered, granular, or pasty form.	Safety matches, camphor, and naphthalene.

	<b>Spontaneously combustible substances</b> can burn by themselves, without being exposed to a heat source. Because of this, they can cause other materials to burn.	White phosphorous.
	There are certain substances that are classified as <b>dangerous when wet</b> . When these substances come in contact with water they can give off flammable gases that can explode.	Calcium carbide and sodium.
	<b>Oxidizing substances</b> are chemicals that contain one or more oxygen atoms. They are not particularly hazardous on their own but become dangerous when mixed with other hazardous chemicals.	Hydrogen peroxide, calcium hypochlorite (pool chlorine), and ammonium nitrate.
	Also called poisonous substance, <b>toxic substance</b> are products and materials that can make you very ill or even kill you. Many substances found in workplaces are poisonous.	Pesticides (not most herbicides), heavy metal products, and rat poison.

## 2.3 Personal protective equipments(PPE)

PPE is any clothing or equipment that is designed to protect any part of your body from workplace hazards that you can absorb, inhale, or that can physically touch you.

PPE is equipment that will protect the user against the risk of accidents or of adverse effects on health. It can include items such as safety helmets, gloves, eye protection, high-visibility clothing, safety footwear, safety harnesses and respiratory protective equipment (RPE).

### 2.3.1 Importance of personal protective cloth (PPE)

Making the workplace safe includes providing instructions, procedures, training and supervision to encourage people to work safely and responsibly. Even where engineering controls and safe systems of work have been applied, some hazards might remain. These include injuries to:

- The lungs, e.g. from breathing in contaminated air;
- The head and feet, e.g. from falling materials;
- The eyes, e.g. from flying particles or splashes of corrosive liquids;
- The skin, e.g. from contact with corrosive materials;
- The body, e.g. from extremes of heat or cold.

PPE is needed in these cases to reduce the risk.

Employers should ask themselves the following questions:

- Who is exposed and to what?
- How long are they exposed for?
- How much are they exposed to?

### 2.3.2 Appropriate selecting and using PPE

- Choose products which are suitable to the residual risk and are the required standard, suppliers can advise you.
- Choose equipment that suits the user – consider the size, fit and weight of the PPE. If the users help choose it, they will be more likely to use it.
- If more than one item of PPE is worn at the same time, make sure they can be used together, e.g. wearing safety glasses may disturb the seal of a respirator, causing air leaks.
- Instruct and train people how to use it, e.g. train people to remove gloves without contaminating their skin. Tell them why it is needed, when to use it and what its limitations are.





### 2.3.3 Other advice on PPE

- Employers should never allow exemptions from wearing PPE for those jobs that ‘only take a few minutes’.
- Employers should check with the supplier on what PPE is appropriate – explain the job to them.
- Employers, if in doubt, should seek further advice from a specialist adviser.




## Maintenance

PPE must be properly looked after and stored when not in use, e.g. in a dry, clean cupboard. If it is reusable it must be cleaned and kept in good condition.

**Table: 2.3 Types of PPE that can be used**

No.	Types of PPE to fishery	Description	Figure
1	Eyes goggles	Chemical or metal splash, dust, projectiles, gas and vapour, radiation Safety spectacles, goggles, face screens, face shields, and visors Make sure the eye protection chosen has the right combination of impact/dust/splash/molten metal eye protection for the task and fits the user properly.	
2	Head and neck (Helmet)	Impact from falling or flying objects, risk of head bumping, hair getting tangled in machinery, chemical drips or splash, climate or temperature Industrial safety helmets, bump caps, hairnets and fire fighters' helmets.	
3	Ear noise	a combination of sound level and duration of exposure, very high-level sounds are a hazard even with short duration Earplugs, earmuffs, semi-insert/canal caps	
4	Hands glove	Abrasion, temperature extremes, cuts and punctures, impact, chemicals, electric shock, radiation, biological agents and prolonged immersion in water Gloves, gloves with a cuff, gauntlets and sleeving that covers part or all of the arm	



5	boots	Wet, hot and cold conditions, electrostatic build-up, slipping, cuts and punctures, falling objects, heavy loads, metal and chemical splash, vehicles Safety boots and shoes with protective toecaps and penetration-resistant, mid-sole wellington boots and specific footwear, e.g. foundry boots and chainsaw boots .	
6	Respirator	oxygen-deficient atmospheres, dusts, gases and vapours	
7	Whole body suits	Heat, chemical or metal splash, spray from pressure leaks or spray guns, contaminated dust, impact or penetration, excessive wear or entanglement of own clothing Conventional or disposable overalls, boiler suits, aprons, chemical suits.	

### 2.3.4 Emergency equipment

Careful selection, maintenance and regular and realistic operator training is needed for equipment for use in emergencies, like compressed-air escape breathing apparatus, respirators and safety ropes or harnesses.

A) **Personal flotation device (PFD)**; also referred to as a life jacket, life preserver, life belt, Mae West, life vest, life saver, cork jacket, buoyancy aid or flotation suit) is a flotation device in the form of a vest or suite that is worn by a user to prevent the wearer from drowning in a body of water. The device will keep the wearer afloat with their head and mouth above the surface. They do not have to swim or tread water in order to stay afloat and can even be unconscious.

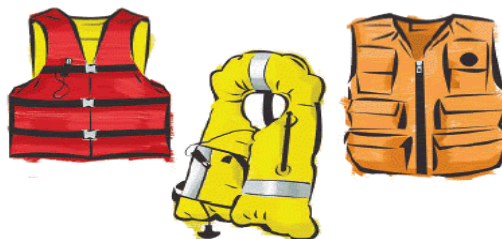


Figure: 2.1 personal flotation device



B) **Sunscreens (protect the skin):** They play an important role in blocking ultraviolet (UV) radiation from being absorbed by the skin. UV radiation damages the skin and can lead to sunburns and skin cancer. No sunscreen blocks UV radiation 100%.



**Figure: 2.2 Sunscreen lotion**

C) **First aid kit:** Hooks impaled in your skin, cuts from a fish's sharp fins, and other fishing-related wounds can be immediately treated by carrying some basic medical supplies. Accidents happen on the water so you need to be prepared for those mishaps by carrying a first-aid kit to help you treat minor injuries and keep you fishing.



**Figure 2.3 First aid kit**

## 2.4 Identifying unsafe and inefficient working area

Finding the right materials, tools and equipments among different items is the most critical aspect in fishery activity. All the items should be checked before utilization for their

- Safety; right material,
- No damage and
- Appropriate amount for a specific activity.

### Report insufficient or faulty items

Damaged, broken, and material which are not fit for fishery activities should be identified and reported to the responsible person in time.

## 2.5 Providing clear instruction of cover task

Instructions and directions provided by supervisor are followed and clarification is sought when necessary. Any employee who works in industry which fish rising or any farmer who raise his own stock must follow the following instruction and direction:-

- Enterprise policies and procedures
- Manufacturer instructions
- Material safety data sheets (MSDS)

The MSDS is a detailed informational document prepared by the manufacturer or importer of a hazardous chemical. It describes proper handling and rising activates of fish.

MSDS's contain useful information such as:

- Flash point
- Toxicity
- Procedures for spills and leaks and
- storage guidelines.

Information included in a Material Safety Data Sheet aids in the selection of safe products, helps you understand the potential health and physical hazards of a chemical and describes how to respond effectively to exposure situations

- OHS standards and procedures
- Specifications for tools, equipments and materials
- Standard Operating Procedures (SOP)

It is a set of step-by-step instructions compiled by an organization to help workers carry out complex routine operations. SOPs aim to achieve efficiency, quality output and uniformity of performance, while reducing miscommunication and failure to comply with industry regulations

- Verbal directions from manager or supervisor
- Work instructions and standards
- Work notes

Instructions and directions provided by supervisor must be followed and if we have any question we can ask when necessary. And also employee must observe and follow Enterprise policies and procedures in relation to workplace practices in the handling and disposal of materials.

## 2.6 Applying fishing techniques

### Overview of aquaculture methods and practices

A number of aquaculture practices are used world-wide in three types of environment (freshwater, brackish water, and marine) for a great variety of culture organisms. Freshwater aquaculture is carried out either in fish ponds, fish pens, fish cages or, on a limited scale, in rice paddies.

Brackish water aquaculture is done mainly in fish ponds located in coastal areas.

Marine culture employs either fish cages or substrates for molluscs and seaweeds such as stakes, ropes, and rafts.

Culture systems range from extensive to intensive depending on the stocking density of the culture organisms, the level of inputs, and the degree of management. In countries where government priority is directed toward increased fish production from aquaculture to help meet domestic demand, either as a result of the lack of access to large water bodies (e.g., Nepal, Central African Republic) or the over-exploitation of marine or inland fisheries (e.g., Thailand, Zambia), aquaculture practices are almost exclusively oriented toward production for domestic consumption.

These practices include:

- i) Fresh water pond culture;
- ii) Rice-fish culture or integrated fish farming;
- iii) Brackish water finfish culture;
- iv) Mari culture involving extensive culture and producing fish/shellfish (e.g., oysters, mussels, cockles) which are sold in rural and urban markets at relatively low prices.

**Table 2.4 shows the summary of comparative feature among the three main culture system**

Parameter	Extensive	Semi-intensive	intensive
Species used	Monoculture/poly culture	Mono culture	Mono culture
Stocking rate	moderate	Higher than extensive	Maximum
Fertilizer	Used to enhance natural productivity	Used regularly with lime	No used
pesticide	No used	Used for regularly prophylaxis	Used regularly for prophylaxis
Cropping frequency	2	25	25
Quality of product	Variable size	Uniform size	Uniform size

Self-Check – 2	Written test
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Name..... ID..... Date.....

**Directions:** Answer all the questions listed below.

**Test I: Multiple choices**

- One of the following fishery equipments play an important role in blocking ultraviolet (UV) radiation from being absorbed by the skin;
  - Personal floatation
  - Sunscreen lotion
  - First aid kit
  - Glove
- One is a device of fishery farming, used to measure the amount of salt in water;
  - PH meter
  - Oxygen meter
  - Salinity meter
  - Thermo meter

**Test II: Short Answer Questions**

- List the common materials, tools and equipments those used for fish farming activities?
- What are aquaculture practices those are almost exclusively oriented toward production for domestic consumption?
- List the appropriate PPE which are important for fishing activities?

## LG #3

## LO # 3-Asses and Adjust fishing gears

### Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Assessing the performance of fishing gears
- Measuring fishing gear components
- Assessing and comparing effectiveness and developments fish gears operation
- Adjusting and reconditioning fishing gears components

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Performance of fishing gears
- Measuring fishing gear components
- Asses and compare fish gears operation
- Adjust and recondition fishing gears

### Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”



### Information Sheet-3

## 3.1 Assessing the performance of fishing gears

Fishing gear are equipment or devices used for fishing. Fishing gears vary greatly in their structure, materials used and principles of capture process and methods of operation. Traps are impounding devices into which an organism is lured either for food or shelter and are unable to escape.

### 3.1.1 Different types of fishing gear

**A) Beach Seine:** Beach seines are of two types; the beach seine with bag and the beach seine without a bag. The net with a bag resembles a trawl net with two wings, the body and the bag or cod-end. The beach seine without a bag has a specialized construction in the central part with more slack and smaller meshes.

The size of the beach seine depends on the depth of operation, number of fishermen involved, use of banca, availability of pull rope hauler(s) and target species. A majority of the surveyed beach seines have lengths varying from 50 to 200 meters and depths of 2-10 meters.

A net shot by hand or from a small boat in a circular shape and drawn ashore by hand from both ends, which targets fish living close to the shoreline. Beach seines are surrounding nets operated with two long ropes, set from the shore for encircling a school of fish in shallow coastal waters.

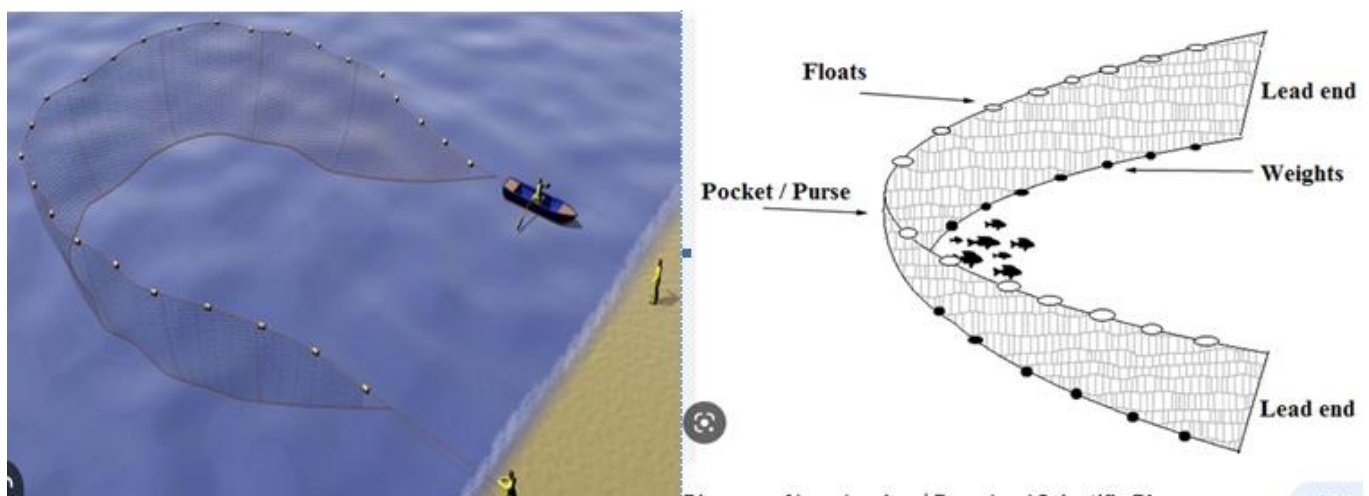
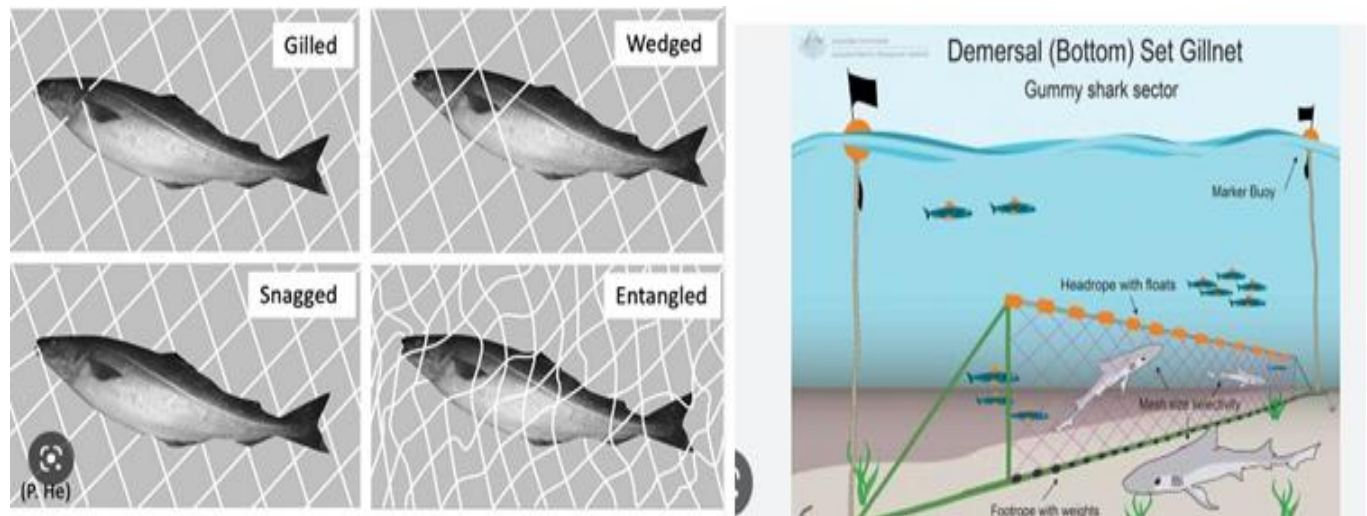


Figure 3.1 different types of fishing gear

**B) Gill net for costal:** is a fishing method that uses gillnets; vertical panels of netting that hang from a line with regularly spaced floaters that hold the line on the surface of the water. The floats are sometimes called "corks" and the line with corks is generally referred to as a "cork line." The line along the bottom of the panels is generally weighted. Traditionally this line has been weighted with lead and may be referred to as "lead line." A gillnet is normally set in a straight line. Gillnet fishing is only one of many different types of fisheries that have by-catch. Gillnets are made of either multi-filament twine or monofilament nylon, woven into netting designed to lock behind the gills of fish. Fish may be caught by gillnets in three ways:

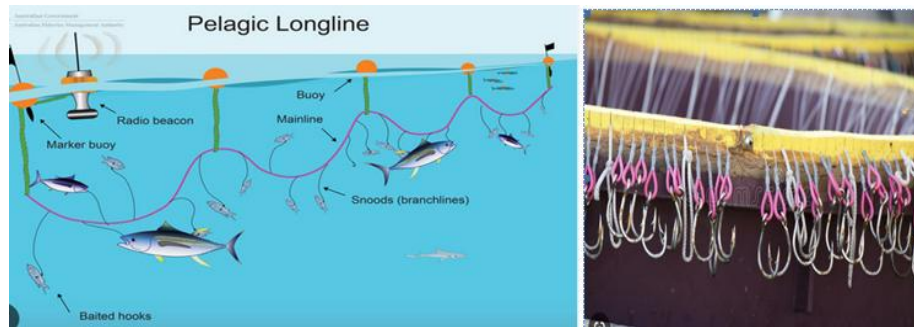
- I. Wedged - held by the mesh around the body.
- II. Gilled - held by mesh slipping behind the opercula.
- III. Tangled - held by teeth, spines, maxillaries, or other protrusions without the body penetrating the mesh.



**Figure: 3.2 Gillnet for costal**

**C) Long line hook:** Long line fishing, or long lining, is a commercial fishing angling technique that uses a long main line with baited hooks attached at intervals via short branch lines called snoods or gangions. A snood is attached to the main line using a clip or swivel, with the hook at the other end. Long-line fishing, or long-lining is a fishing method that involves setting out a large number of short lines carrying hooks, which are attached to a longer main line at regular intervals. The short lines are suspended horizontally at a predetermined depth with the help of surface floats.

Long lines are classified mainly by where they are placed in the water column. This can be at the surface or at the bottom. Lines can also be set by means of an anchor, or left to drift. Hundreds or even thousands of baited hooks can hang from a single line. This can lead to many deaths of different marine species.



**Figure: 3.3 long line hook**

### 3.1.2 The Ideal fishing gear

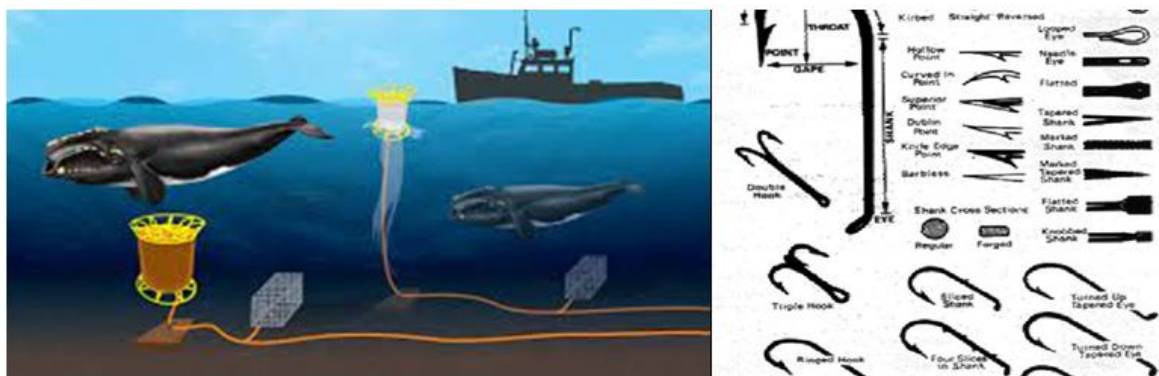
Some criteria for the ideal fishing gear could be:

- highly selective for the target species and sizes, with negligible direct or indirect impact on non target species, sizes and habitats
- effective, giving high catches of target species at lowest possible cost;
- quality orientated, producing catches of high quality

According to these and additional criteria that could be added to the list, it can easily be stated that the ideal fishing gear does not exist, as no fishing gear fulfils the complete list of desired criteria and properties.

However, in the process of moving towards sustainable fisheries management, different fishing gears with their specific properties and potential for improvement are an important compartment in the fisheries.

A basic understanding of the properties, function and operation of the major fishing gears and methods is therefore fundamental for decision making in fisheries management, particularly when it comes to technical measures in fisheries regulations.



**Figure: 3.4 The ideal fishing gear**

### 3.1.3 Classification of fishing gears

Fishing gears are commonly classified in two main categories: passive and active. This classification is based on the relative behaviour of the target species and the fishing gear. With passive gears, the capture of fish is generally based on movement of the target species towards the gear (e.g. traps), while with active gears capture is generally based on an aimed chase of the target species (e.g. trawls, dredges). A parallel on land would be the difference between the trapping of and hunting for animals.

### 3.1.4 Fishing gear components

Fishing tackle is the equipment used by anglers when fishing. Almost any equipment or gear used in fishing can be called fishing tackle, examples being hooks, lines, baits/lures, rods, reels, floats, sinkers/feeders, nets, stringers/keep nets/ live wells, spears, gaffs, traps, waders and tackle boxes, as well as any wire, snaps, beads, spoons, blades, spinners, clevises and tools that make it easy to tie knots.

Gear that is attached to the end of a fishing line (and thus get cast out along with the bait) is collectively called terminal tackles, which include hooks, leaders, floats, sinkers/feeders, swivels and any attached snaps and/or split rings. Sometimes the term "rig" is used for a routine assembly of terminal tackle combination.

Fishing tackle can be contrasted with fishing techniques. Fishing tackle refers to the physical equipment that is used when fishing, whereas fishing techniques refers to the manner in which the tackle is used (or "presented") when fishing.



Some additional example of fishing gear components are the following;

- **Sweeps and bridles**

The development of different sweeps (and the power and ability to deploy them) has allowed trawlers broader access to fishing grounds. The introduction of cookie, roller, and rock hopper sweeps allowed access to fishing grounds initially inaccessible to trawlers due to rocky and un- even bottom.

The sweep set uses the water tension on the line to apply pressure. You're not trying to pick up the slack; instead you're counting on the tension along the line to transfer energy down to the fly. Think about how the current pushing on your line makes your fly swing at the end of a drift. It's the same principle at work in the sweep set. By pulling on the line, you're kind of creating an artificial current.



### Info graph: 3.1 Sweeps

- **Bridle:** is made from spring grade stainless wire with specially designed bends and a rubber retaining band that firmly holds the hook in place



Figure: 3.5 Bridle



- **Hanging:** If you happen to catch more **fish** than you can eat or sell at one time, try hanging one for a day or two. This works better in a closed environment.



**Figure: 3.6 Hanging**

- **Gear detection device**

Important fish detection devices are echo sounder and sonar. Acoustic devices such as trawl eye and net sonde are used for monitoring of gear performance and improving capture efficiency in aimed mid water trawling and purse seining

Acoustic devices (sometimes referred to ‘pingers’) may be deployed on fishing gear to deter marine or freshwater mammals. This may reduce the risk of mammals becoming entangled or captured in fishing gear. Mammal predation on fish catches may also decrease, which may reduce human-wildlife conflict at wild fisheries. However, acoustic devices should be used with caution as the effects can span large distances and mammals may be deterred from important habitats or migration routes.

## **3.2 Measuring fishing gear components**

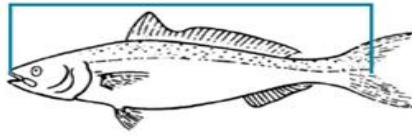
### **3.2.1 Rules for fishing gear, methods, and measuring**

Find out about rules for specific fish, fishing gear, and methods, including set nets, set lines, and species. Get recommendations about sustainable fishing and protecting seabirds.

### **3.2.2 Measuring fish and shellfish**

Stay within the legal size limits and accurately measure your catch to help keep local fisheries sustainable. Use the following measurement guides to measure fish, rock lobster (crayfish), and shellfish.

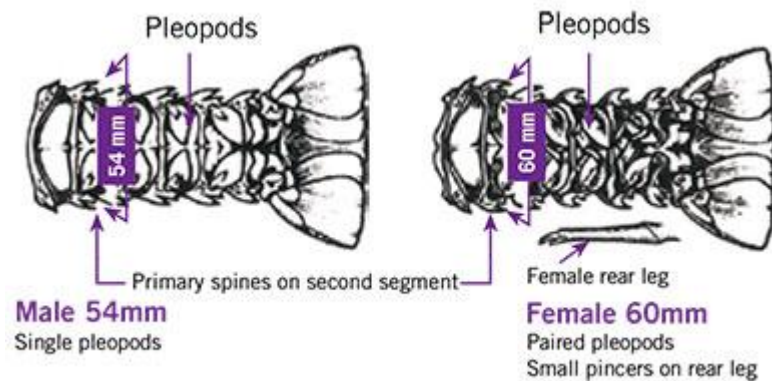
- **Fin fish**



**Figure: 3.7 measuring fishfin**

Finfish length is measured from the tip of the nose to the middle ray or 'V' in the tail.

- **Red or spiny rock lobster (crayfish)**



**Figure: 3.8 measuring fish spiny rock**

Measure red or spiny rock lobster tail width in a straight line, between the tips of the two large (primary) spines on the second segment of the tail. If you're not sure what sex the lobster is, use the 60mm measurement.

You can determine sex by these characteristics:

- ✓ females have small pincers on the rear pair of legs
- ✓ females have pleopods (see diagram) in paired form on the underside of their tails
- ✓ males have pleopods (see diagram) in single form on the underside of their tails.

- **Packhorse rock lobster (crayfish)**



**Figure: 3.9 Mesuring fish packhorse rock lobster**

Measure the tail length along the underside in a straight line from the rear of the calcified bar on the first segment to the tip of the middle fan of the tail. Must have a tail length of at least 216mm (male and female).

- **Paua**



**Figure: 3.10 Mesuring fish paua**

Measure the flat face of the paua in a straight line. Do not measure over the curve of the shell.

- **Scallop**



**figure 3.11 Measure the greatest diameter of the shell.**

### **3.3 Assessing and comparing effectiveness and developments fish gears operation**

- Fishing is an art of catching fish and other aquatic animals.
- Many years ago man started using various type of gear used for hunting the terrestrial animals and for fishing also.
- It is very difficult to say which started first, but some time it is opined that fishing is younger. Reason behind it is easy to catch animals in the land than in the water.
- In older days fishing was not having much importance as there was no demand for fish.
- Earlier fishing was restricted to a particular community but now it becomes a business.
- In order to meet the increased demand, fishing is now carried out industrially.
- Fishing technology not only concerns fishing gear, fishing methods and vessels but also concern biological and environmental factors.
- Fishing technology has developed continuously by utilizing improved and larger fishing vessels, more sophisticated fishing equipment and preservation techniques.

- With the increase in population, larger quantities of seafood became necessary hence individual harvesting was replaced by groups fishing with larger and more effective fishing gear.
- Mechanization in fishing industry started during the second half of the nineteenth century with the use of steam driven capstans.
- Steam power was successfully used in towing a trawl for the first time in 1877.
- Steam gradually replaced manual and sail propulsion.
- This was later superseded by the internal combustion engines.
- Today, the diesel engine is universally favored for larger vessels and petrol/kerosene driven outboards for small boat operations.
- Development of electrical and hydraulic power systems led to complete mechanization of fishing which use larger nets and lines, or more pots and traps.
- During the last 50 years, synthetic fibers, which are virtually rot-proof, gradually replaced natural materials in the fabrication of nets and lines.
- These materials have greatly extended the useful life of fishing gear.
- This along with the introduction of mechanized net and rope making increased the size and complexity of nets.
- Developments in new synthetic materials and fabrication techniques are continuously improving fishing gear effectiveness and efficiency.
- Traditionally fishermen detect fish through local knowledge, record keeping, and observation of schools breaking to surface, and the behavior of birds and other sea creatures.
- In deeper waters fishes were detected from the vibration of signal lines dropped from the vessel.
- The introduction of electronic fish finding equipment a half century ago has revolutionized the process of finding fish to catch.
- Aircraft enable much greater areas to be searched visually, while satellite and laser technology are being utilized as aids for identifying suitable environmental conditions.
- Fish finding sonar and echo sounders rapidly analyse signals from high performance transducers and display detailed information to the fisherman.

### **3.3.1 Evolution of fishing gears**

- Before the invention of any fishing gear, men used their hands (hand picking) to catch fish and other aquatic organisms from the shallow water lakes, rivers and seas.

- However, it was only possible to collect sedentary, stranded slowly moving organisms by hand picking.
- To prevent the escape of fish, methods were developed to stun and stupefy the fish either mechanically or electrically.
- The capacity to capture live fish or the stupefied ones was limited by the length of the arm.
- To overcome this problem and to extend the range of the fisherman, spears or lances were developed.
- The reach of spears pushed by hand can be extended by using them as a casting gear.
- To prevent the fish from escaping the thrown gear, facilities for retrieving the catch are necessary which is characteristic of harpooning.
- The use of spears for catching fish implicates some injury to the prey.
- To catch delicate organisms without causing damage, a number of grasping instruments have been developed. Eg. Clamps, tongs, rake etc.
- These gears like the spearing and shooting gear have been developed to extend the range of the human arm and to secure the catch more efficiently.
- Luring the fish with bait and catching them led to the development of line fishing.
- The bait is presented in such a manner that the fish is neither able to take away the bait nor it can escape once it takes the bait.
- Various types of fishing lines have developed. The simplest form of fishing line is the hand line.
- The number of hand lines operated by a single man is limited. In order to operate more lines, set lines have been developed.
- From simple fishing lines capable of catching a single fish, long lines with thousands of hooks which extend to considerable length have been developed.
- The need to operate over a larger area using a movable fishing line led to the development of trolling lines.
- Fishing with primitive gear is confined to shallow water areas.
- Permanent and semi permanent and barriers were erected in the areas with changing water level for catching fish.
- This is practiced in the areas of fresh waters and the ebb and flow areas along the sea coast.
- The barriers prevent fish from escaping when the water recedes.
- This was the beginning of filtering fishing gear.



### 3.4 Adjusting and reconditioning fishing gears components

These are just a simple steps and example of rod repaired, adjusting and reconditioning to ready fishing activities.

**Step 1. Rod From the Garbage**

**Step 2: The Reel**

**Step 3: The Break**

**Step 4: Repairing the Break**

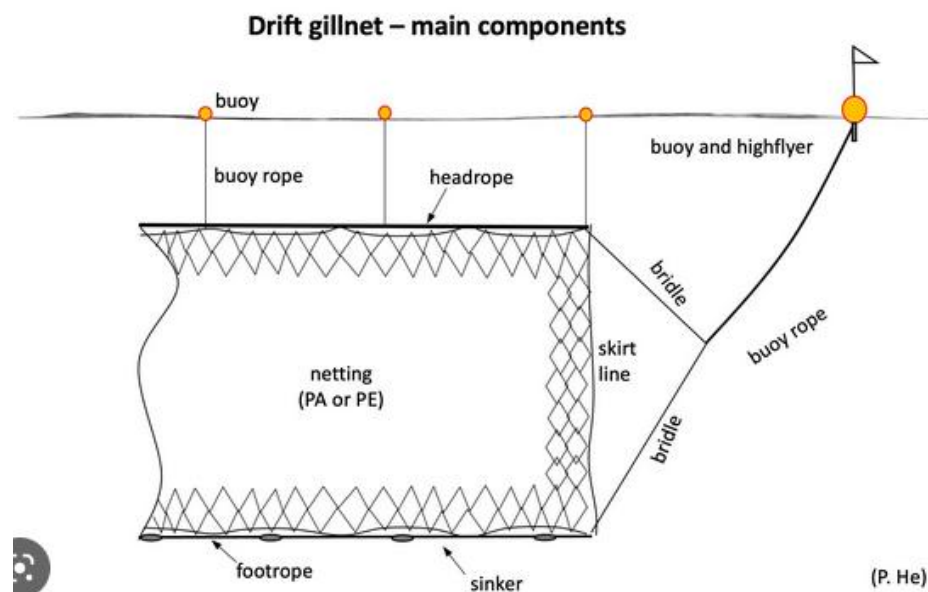
**Step 5: Whipping**

**Step 6: Whipping the Ferrule**

**Step 7: Whipping the Guide**

**Step 8: The Finished Fishing Rod**

Once the lacquer is set reattach the reel put some fishing line the right poundage on the reel and you are ready to go fishing. Depending on how fast the resin or lacquer sets this repair can take as little as one hour.



**Figure: 3.12 Adjusting and reconditioning gill net**

Self-Check – 3	Written test
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Name..... ID..... Date.....

**Directions:** Answer all the questions listed below.

**Test I: Multiple choices**

- One of the following fishing gear is a fishing method, vertically panels of netting that hang from a line with regularly spaced floaters that hold the line on the surface of the water;
  - Beach seines
  - Gill net
  - Sweeps and bridles
  - Long line
- One of the following activities is important works better in a closed environment, if you happen to catch more fish than you can eat or sell at one time;
  - Hanging
  - Reels
  - Sweeps
  - Bridles

**Test II: Short Answer Questions**

- List the components of fishing gears?
- What are the two important fish detection devices?
- What are the two main classification of fishing gears?

### Operation Sheet -3

Using and repairing netting gear

#### A. Tools and equipment's

- Mesh
- Gear
- Patch
- flipper
- Wire
- Suitable PPE

#### B. Procedures/Steps/Techniques

- Wear appropriate PPE
- Lay your ripped mesh fabric onto a flat surface.
- Open your Gear Aid Mesh Patches and peel one of the patches.
- Center the patch over the damaged area and press firmly for about 30 seconds to apply the first patch.
- Flip the mesh fabric over and peel the second Gear Aid Mesh Patch.
- Repeat the process on the other side.
- Lay the second patch evenly on top of the first one and press firmly for about 30 seconds to apply.
- Make sure the patch is firmly applied.

LAP TEST-3	Performance Test
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Name..... ID.....

Date.....

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

**Instructions:** Given necessary templates, tools and materials you are required to perform the following tasks within **1** hour. The project is expected from each student to do it.

**Task:** Perform using and repairing netting gear

## LG #4 LO # 4 - Position fish gear to optimize catch

### Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Setting fishing gear on water body
- Analyzing catch and determining fish net
- Monitoring positions of fish gears and optimizing the catch
- Monitoring boat position and retrieval of fishing gears

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Set fishing gear on water body
- Analyze catch to determine fish net
- Monitoring positions of fish gears to optimizing the catch
- Monitor boat position and retrieval of fishing gears

### Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”



## Information Sheet-4

### 4.1 Setting fishing gear

#### 4.1.1 Steps of setting gears

How to Setup and Use a Spinning Rod and Reel

Step 1: Gather Your Equipment. Spinning Reel. ...

Step 2: Understand the Important

Parts of the Equipment (the Reel)

Step 3: Connect the Reel

to the Rod.

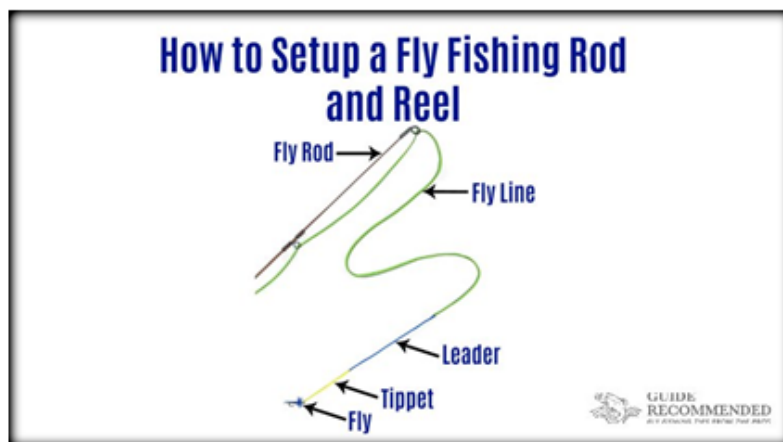
Step 4: Spool the Reel.

Step 5: String the Rod. |

Step 6: Tie the Knot. ...

Step 7: Set the Drag Knob. ...

Step 8: Cast the Bait.



Info graphics: 4.1 steps of setting gear

### 4.2 Analyzing catch and determining fish net

Catch location data are used to monitor spatial trends in fishing patterns and from those infer distribution patterns of pelagic species.

#### 4.2.1 Analyzing catch net

On a fish farm, live fish must be handled on many occasions, including during routine monitoring of growth and health, during transfer from one pond to another, and during final harvesting. Fish are usually handled with the aid of nets and other small pieces of equipment. However, it is necessary to keep in mind some points mentioned above.

- If the beneficiaries themselves will collect the brood stock, it is important they understand that looking for fish close to home is preferred.

- One of the main principles will be to use only non-destructive gear for the local wildlife.
- Care should be taken to respect the laws relating to fishing. Where appropriate, permits have to be requested from the local authorities.

### A. Seine fishing nets

One of the main pieces of equipment used to catch fish is the seine net. This is the easiest way to catch alevins.

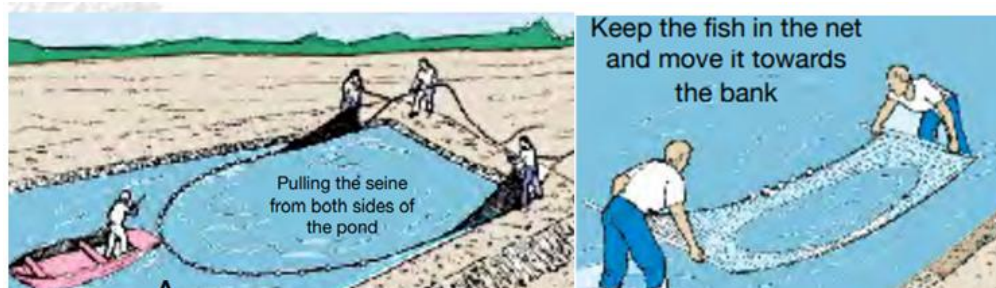


Figure 4.1 seine net

### B. Gill nets

The gill net is one of the most widely used nets in freshwater capture fisheries. It may also be useful on a farm for selective harvesting of larger fish for market. In overall shape and design, a gill net is very similar to a seine net.

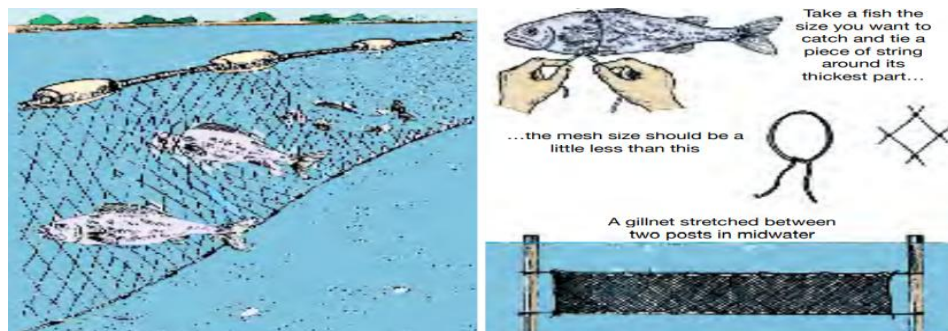


Figure 4.2: Gill net

### C. Cast nets

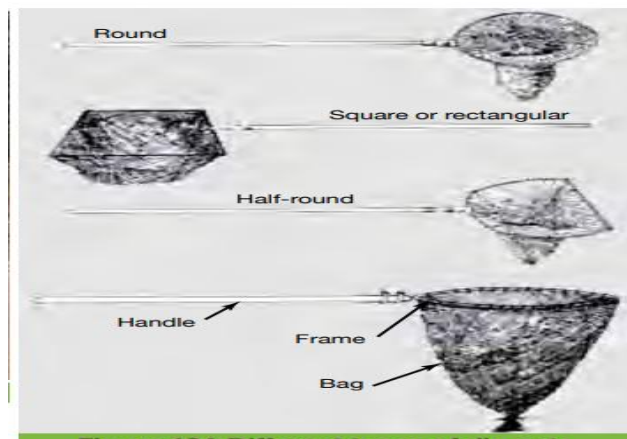
The cast net is another type of non-destructive fishing gear that fishermen often use for capturing fish. It is a good tool for capturing large fish without damaging them. A cast net is made of a flat circular piece of small-mesh netting, heavily weighted along its periphery with sinkers. Usually a series of strings runs from the outer edge through a central ring to join into a single pulling rope. A cast net is not very easy to make, but can be bought from a specialized store.



**Figure: 4.3 Cast net**

#### **D. Dip or hand nets**

Dip nets are commonly used on fish farms to handle and transfer small quantities of fish. Farmers can buy completed nets, assemble them from ready-made parts, or make them themselves. A dip net has three basic parts bag, frame, metal or wooden handle.



**Figure: 4.4 Different types of dip net**

#### **E. Traps**

Many different kinds of traps can be used when fishing in lakes and rivers in the effort to capture brood stock or associated species such as catfish. Certain kinds of traps may be useful for simple and regular harvest of fish for food that does not disturb the rest of the pond stock. These traps are usually made with wood, plastic pipe, bamboo or wire frames, and have surfaces made of netting, bamboo slats or wire mesh.

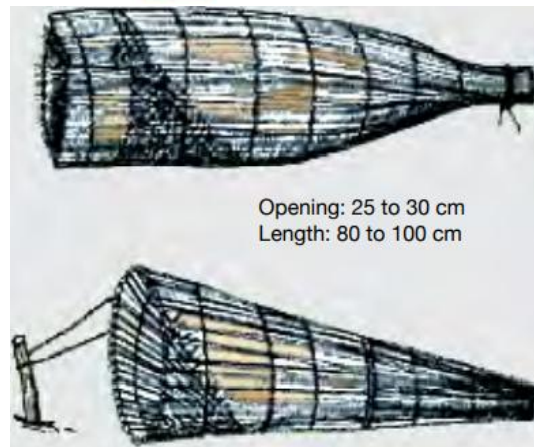
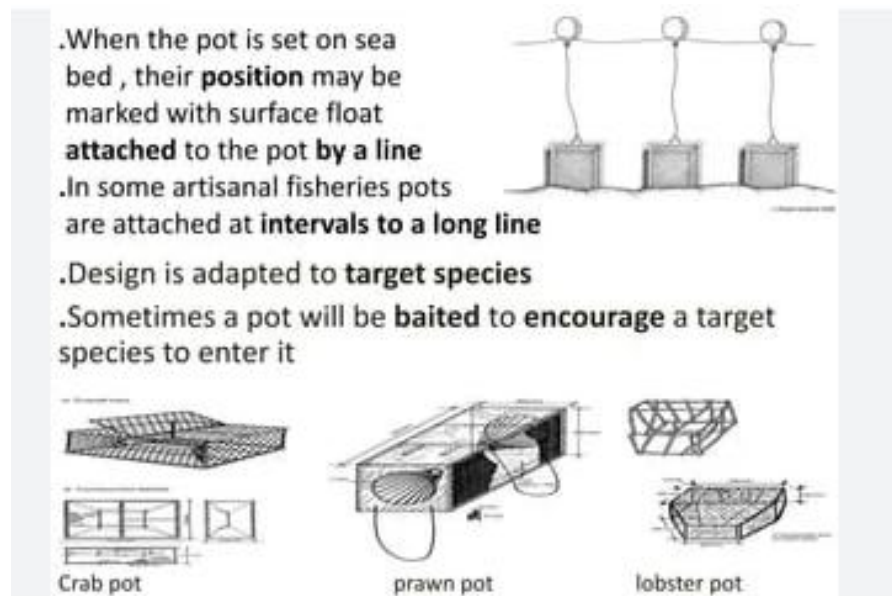


Figure: 4.5 different types of fish rape

#### 4.3 Monitoring positions of fish gears and optimizing the catch



Info graph 4.2 position of fishing gear

#### 4.4 Monitoring boat position and retrieval of fishing gears

Boat positioning is critically important for three reasons.

- First, you need to catch a bass.
- Second, you need to get it to the boat.
- Third, you need to catch as many bass as possible from the same spot.

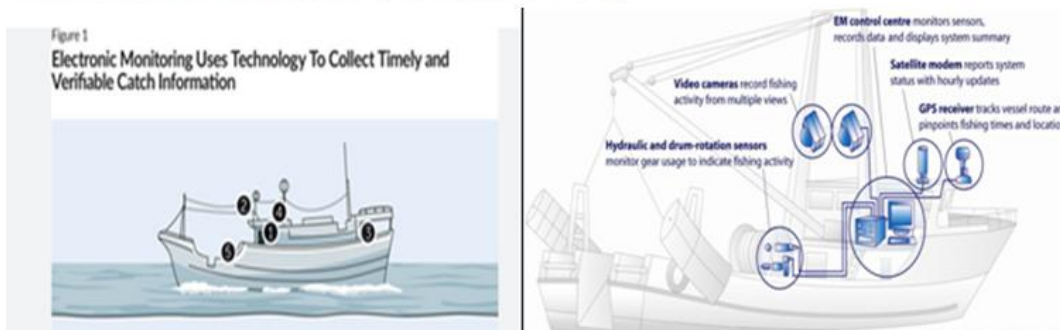
The key to knowing how to position a bass boat to catch more bass is to know the bass' main forage. If bass eat crawdads, bluegill, or other pan fish then you typically position the boat out deep, cast shallow,



and work your bait downhill. If bass are eating trout, kokanee, gizzard shad, etc... you typically position the boat shallow, cast deep, and work the bait uphill.

#### 4.4.1 Boat position and bass

- Points - Don't pull up on top of the point and cast in every direction.
- The Banks - Don't be too far from shore.
- Deep Spots - Don't move!
- Flip in and Pitch in - Don't be too close or too far either.
- Small Cuts and Pockets - Don't overlook the obvious.
- Coves - Don't be loud.



**Figure: 4.6 Boat position**

#### 4.4.2 Understand the water wave

Waves and currents are created by the energy that flows through the water, moving it in a circular motion. But water doesn't really move like a wave. Waves transmit energy across the ocean, not water, and waves can traverse the entire basin unless constrained by something. Waves are most commonly caused by the wind. Wind waves and surface waves are caused by friction between the wind and surface water. As the wind blows across the surface of the sea or lake, continuous disturbance creates the summit of the waves. These types of waves are found in the open ocean and along the coast around the world.

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			January, 2023

Marine fish farms are increasingly being relocated to more exposed regions. The fish farms will be subjected to stronger currents and more intense waves. In addition, the size of the fish farms is likely to grow, and new designs will emerge. As a result, the importance of marine technology will rise. Damages and collapses of floating fish farms have resulted in fish escape and, as a result, significant economic losses. Operational failures, mooring line breaks, anchor draw out, interactions between chains or ropes and the net, and accidents with ships can all result in damage. Escaped farmed salmon may breed with wild salmon, contaminating the wild fish's genetics. Another issue is salmon lice. Multitrophic aquaculture is a method of dealing with faeces and feed spillage from fish net cages in order to provide nutrients to mussels and kelps, for example. To avoid salmon lice and reduce pollution, closed fish farms have been erected.



**Figure:4.7 Water wave**



Self-Check – 4	Written test
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Name..... ID..... Date.....

**Directions:** Answer all the questions listed below.

**Test I: Multiple choices**

- One of the following net is most widely used nets in freshwater capture fisheries and may also be useful on a farm for selective harvesting of larger fish for market;
  - Gill net
  - Seine net
  - Cast net
  - Trap net
- One of the following nets is commonly used on fish farms to handle and transfer small quantities of fish;
  - Dip net
  - Trap net
  - Seine net
  - Cast net

**Test II: Short Answer Questions**

- What are the three critically important of boat positioning?
- List boat position and bass?

## LG #5

## LO # 5 - Collect the caught fish

### Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Collecting fish
- Sorting and returning undersized fish
- Handling of caught fish

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Collect fish from net and hook
- Sort and return back undersized fish to water
- Handle of caught fish

### Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

## Information Sheet-5

### 5.1 Collecting fish

#### 5.1.1 Techniques for collecting freshwater fishes

There is a wealth of gear and techniques, both ancient and modern, for collecting freshwater fishes. Methods commonly used by ichthyologists to collect specimens for study are:

##### 5.1.1.1 Straight seines collecting fish

The net is often 5-15 feet long (but sometimes much longer), 5-6 feet deep, with a 1/16 to 1/8 mesh size. Heavy lead weights along the bottom (lead line) keep the net close to the substrate and bouyant floats along the top (float line) help keep the net extended. The straight seine may be stretched between two poles (brailles) or simply maneuvered by two people whereby each person loops the end of the lead line around his/her foot and holding the float line up with one hand. Seining typically involves one or two people setting the net downstream of a particular habitat (e.g., rocky riffle, submerged snag or woody debris).

##### 5.1.1.2 Bag seines collecting fish

The bag seine is longer than the straight seine (typically 30-35 feet) and has a large bag (typically 6 x 6 x 6 feet) sewn into the center. Bag seines are most effective for pulling over large sandy beaches, particularly at night in the tropics. They also may be used to sample large shallow slackwater habitats with relatively smooth bottoms.

##### 5.1.1.3 Gill/Trammel nets collecting fish

Gill and trammel nets are long nets (>50 feet, usually much longer) made of multifilament (usually multiple strands of nylon filament twisted into a single strand) or monofilament (single clear strand similar to fishing line) and . The net has float (top) and lead (bottom) lines and the mesh may be of a single size (e.g., 1 inch square) or of different sizes (i.e., experimental gill net). A gill net is a single net and a trammel net consists of 2-3 layers of netting (e.g., slack small mesh inner netting between two layers of large mesh netting).

#### 5.1.1.4 Dip nets collecting fish

Dip nets are often used to sample shallow waters with dense aquatic vegetation. The net is thrust into the vegetation to scare out hiding fishes into the net. Alternatively, dip nets are useful for collecting small fishes that hide or nest in or under rocks in shallow water. The net is simply placed downstream of the rock, the rock is lifted, and the fish usually scares downstream into the net. Or, if the fish is hiding in the rock, the rock may be lifted from the water which usually prompts the fish to exit into the net below. Dip nets also are used with backpack electro shockers - but, only ones with wooden handles (or else the user may be shocked).

#### 5.1.1.5 Traps collecting fish

There is a wide variety of "fish traps" (hoop nets, wooden catfish traps, steel or collapsible minnow traps), some of which are examples of the earliest gear used to catch fishes. The premise is relatively constant and involves submerging a baited enclosure of wood, netting or wiry mesh that has one or two small funnel-like entrances (throats). Fishes swim into the enclosure, but usually cannot find their way out.

#### 5.1.1.6 Hook and line collecting fish

This is pretty much speaks for itself. In the hands of the skilled fisherman/woman, any pole, some line and a hook with the right bait, coupled with patience and luck, will yield fish (a reel is optional). For most ichthyologist anglers, size does not matter (but species does).

<https://www.youtube.com/watch?v=mXO93Z8A9dg> /Accessed date 17/12023/

### 5.2 Sorting and returning undersized fish

Take only what you need to reduce overfishing and protect fish stocks. Leaving more fish in the water to breed increases the population. Fish usually swim in schools of similar sizes. Change your fishing spot if you are catching undersized fish. Use larger hooks. Smaller fish are less likely to take large hooks.

Always return live fish back to the water that are:

- under legal permitted length
- more than the legal permitted length
- caught in a closure area
- over your daily personal bag or boat limit

- a protected species
- unwanted live bait.

### **5.2.1 Methods of returning the fish to the water**

Hold the fish horizontally and support its body when gently placing it into the water.

Support larger fish with a hand under the head and belly. This will minimise damage to the backbone.

If the fish does not move off your hands, manually move it through the water. This will help fish that have been over-stressed.

Escape grids are frames of metal, plastics or mesh that are inserted in or near the codend of trawl nets to try and prevent unwanted species or sizes of catch from entering the codend. They are size selection mechanisms, with the sizes at which individuals are sorted dependent on the type of grid and the spacing between the bars of the grid.

Behaviour of individual fish species may also influence how effective the grid is at allowing escape.

When the fitting of size-sorting escape grids is implemented in prawn/shrimp trawl nets, the evidence has been summarized under 'Fishing gear modification.

### **5.2.2 Reduction of unwanted catch**

The fitting size-sorting escape grids of various types and configurations to fish trawl nets reduced the catches of unwanted small mackerel, small monkfish, non-target whiting and haddock, small hake, unwanted spiny dogfish, non-target herring, prohibited halibut, unwanted sizes of cod and other non-target fish, relative to the retained codend catch or compared to trawls without grids.

### **5.2.3 Improved size-selection of fishing gear**

A size-sorting escape grid fitted to trawl nets improved the size-selection of haddock, but not saithe or cod, compared to standard nets without grids.

## **5.3 Handling of caught fish**

Proper handling protects both you and the fish. Some fishes have sharp fins or teeth that can cut. These are some Tips on how to handle different species.

- Minimize the time fish is out of the water (no longer than you can hold your breath.)
- Leave fish in the water if you can and use a tool to remove the hook.

- If possible, keep the fish from thrashing without using a net. If a net is required, use a rubber-mesh landing net instead of abrasive nylon.
- Avoid removing the slime/mucus layer, which protects fish from parasites and infections.
  - ✓ Try to keep fish off the ground or floor of a boat.
  - ✓ Use a wet rag or glove, or wet hands before handling fish.
  - ✓ Turn fish on its back and cover its eyes to calm it.
  - ✓ Don't put your fingers in the eyes or gills.
- Smaller fish (< 5 pounds) can be vertically held by the lower jaw, either by hand or with grippers. Hold larger fish horizontally and support with two hands.

When handling your catch consider the following important points

- Keep the fish wet and calm. Removing fish from water causes stress, suffocation, and possible internal injury.
- Provide proper support. Avoid removing fish from the support of the surrounding water any more than necessary. ...
- Treat the fish gently. ...
- Use wet hands or gloves to handle fish.

#### **Before the catch**

- ✓ Fish in safe waters. Contact your local health department, the Pennsylvania Fish and Boat Commission, or visit this website to determine the safety of fishing waters.
- ✓ To reduce the risk of exposure to disease, wear disposable plastic gloves while handling fish.
- ✓ Check fish you catch for signs of disease or parasites. Healthy fish have bright, clear eyes, and red gills. Diseased fish may have sunken eyes, discolored skin, loose scales, and white, bloody, or slimy gills.
- ✓ Decide what you will do with a fish immediately after catching it. Releasing fish immediately instead of waiting until the end of the day will improve their chances for survival.
- ✓ Clean fish promptly because digestive enzymes will spoil the fish rapidly and off-flavors may develop.

#### **After the catch**

- ✓ Using a clean fillet knife, bleed the fish by cutting the throat, then remove the gills and entrails.



- ✓ Use clean water, premoistened wipes, or alcohol swabs to clean your knife frequently or between cuts to keep from dragging bacteria into the flesh.
- ✓ Wipe the fish surface clean with cloth or paper towels, keep the fish moist, but not wet, by wrapping it in clear plastic wrap, put the fish in a sealable storage bag, and place it on ice or snow.
- ✓ If making fillets, rinse the fish in cold, clean water to remove blood, bacteria, and digestive enzymes.
- ✓ Pesticides or other substances may concentrate in fatty parts of the fish, so remove skin and fat deposits when cleaning fish.
- ✓ To prevent bacterial growth, quickly cool fish to 35-40°F (2-4°C).

### 5.3.1 Handling and releasing your catch

It is important to handling your catch correctly. This will give fish released back into the water the best chance of survival.

Wear gloves to protect yourself against cuts and spines. Wash your hands thoroughly after handling all fish.

### 5.3.2 Measuring and weighing fish

Measure fish instead of weighing. Measuring your catch is less stressful to the fish.

Measure your catch using:

- a wet ruler with a stopper on the end to rest against the nose
- wet hands or a wet cloth to protect the fish eyes and gills.

If you must weigh your catch:

- Use a sling to support the fish horizontally.
- Do not use scales that hang the fish by the jaw. This can damage the jaw, gills, backbone and internal organs.

### 5.3.3 Filleting or cutting up fish sea

Unless you are scaling or gutting fish onboard a boat, it is an offence to:

- cut up
- fillet
- otherwise mutilate fish or crabs.

You can only cut up or fillet fish onboard at the time of the catch if you:

- eat your catch
- use your catch for bait.

#### **5.3.4 Methods of releasing caught fish**

- Unhook fish while still in the water.
- Handle fish with wet hands to reduce damage to the protective slime on the surface of the fish.
- Place fish on a cool and wet surface. Avoid hot and dry surfaces.
- Move quickly. Reducing the time the fish spends out of the water will help reduce trauma to the fish.
- Cut the line if a fish is gut or gill-hooked. Hooks are replaceable and you will not damage the fish by removing the hook.
- Carefully use fish grips when restraining fish. Avoid grips with inbuilt scales, which hold the fish vertically and can cause damage.

#### **If released fish are unable to swim**

- Treating barotraumas in largemouth bass
- Depressurizing saltwater fishes

Self-Check – 5	Written test
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Name..... ID..... Date.....

**Directions:** Answer all the questions listed below.

**Test I: Multiple choices**

All are always true about return live fish back to the water **except** one:

- A. under legal permitted length
- B. more than the legal permitted length
- C. caught in a closure area
- D. Under your daily personal bag

**Test II: Short Answer Questions**

1. What is your decision, if released fish are unable to swim?
2. What are the methods of returning the fish to the water?

## Operation Sheet - 5

### 5.1 Techniques of handling caught fishes

#### A. Tools for safe fish-handling

- Fish-holding cradle
- Hemostats or needle nose pliers
- Measuring board or stick
- Mesh rubber landing net
- Wet wool or cotton gloves
- Suitable PPE

#### B. Techniques of handling fish properly

- Wear appropriate PPE
- Handle fish as little as possible and only with wet hands.
- Match tackle to the targeted fish to land it quickly and minimize stress on the fish.
- A knotless, rubber-coated landing net is ideal when handling a fish since it supports the fish's body weight.
- Remember, fish swim horizontally! Never hold a fish by its jaw, gills or eyes.
- keep large fish, such as tarpon, should not be boated or dragged over the gunwale of the boat.
- Use the other hand under the belly to evenly support the fish's weight.
- Never hold on to or tow a fish not allowed to be harvested to a different location to weigh or measure it.
- Carefully remove the hook if possible
- Reduce handling by using a dehooking tool.
- Release your fish head first into the water

## 5.2. Collecting fishes from the fishing nets and hooks

### A. Tools and equipments used for collecting fish

- Suitable PPE
- Net
- Hook
- Boat
- Bucket
- Container

### B. Steps of collecting fish

- Wear appropriate PPE
- Prepare and organize materials and equipments



Figure 5.1 organize material and equipment

- Choose your net
- Determine mesh size

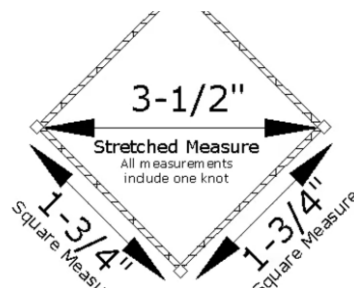


Figure 5.2 determine mesh size

- place net at the right time

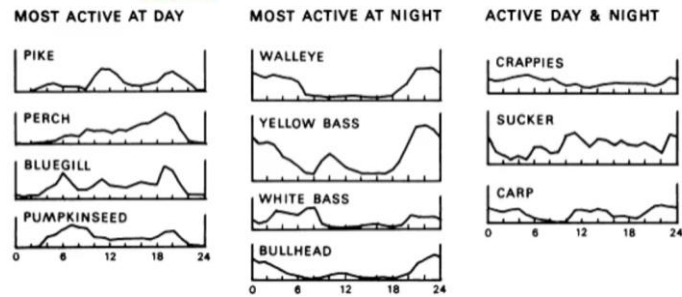


Figure:5.3 Right place of net at right time

- set the net
- Attach float and anchor



Figure: 5.4 Attaching float and anchor

- Drop the anchor and float line.
- Wait for 20 min

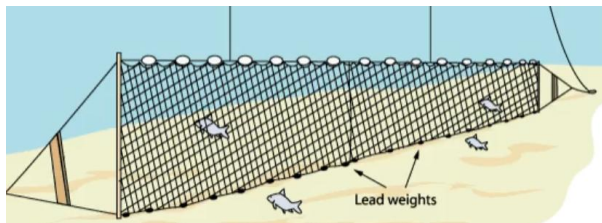


Figure: 5.5 trapping fish net inside water

- Pull in the net
- Remove fish From the net



<b>LAP TEST-5</b>	<b>Performance Test</b>
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Name..... ID.....

Date.....

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

**Instructions:** Given necessary templates, tools and materials you are required to perform the following tasks within **half** hour. The project is expected from each student to do it.

**Task1:** Perform techniques of handling caught fishes.

**Task2:** perform steps of collecting fish.

## LG #6

## LO # 6 – Complete fishing activities

### Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Handling waste materials
- Handling, transporting tools, materials and equipments
- Reporting and documenting workout come

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Handle waste materials
- Handle and transport tools, materials and equipments
- Report and document workout come and sought feedback performance

### Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

## Information Sheet-6

### 6.1 Handling waste materials

#### 6.1.1 Definition of waste

Waste is unwanted material or substance produced by human activity, which is usually referred to as rubbish, trash, garbage or junk.

#### 6.1.2 Waste management and disposal

There are three steps necessary to properly manage waste:

- Identify Wastes
- Evaluate Waste
- Manage Wastes

#### 6.1.3 Proper handling of waste

includes the collection, transport, processing, recycling or disposal of waste materials produced by human activity in order to reduce the negative effect on the environment.

**Fish waste** - large amounts of fish guts deposited in an enclosed area can produce foul odors and impair water quality through decreased dissolved oxygen and increased bacteria levels.

A waste may be:

- Recyclable material (e.g., paper, soda cans)
- Compostable organic waste (e.g. food, animal bedding, biodegradable plastics)
- Non-hazardous solid waste
- Hazardous radioactive waste: containing or contaminated with a radioactive isotope
- Hazardous biological waste: containing or contaminated with an infectious or potentially infectious agent, a biological toxin, animal carcasses, genetically modified organisms, recombinant DNA, etc.
- Hazardous chemical waste: waste chemicals, products which are chemical in nature (cleaning agents, paint, motor oil, and pharmaceuticals), products that contain chemicals (fluorescent lamps, thermometers), or materials contaminated with chemicals (contaminated soil or rags)
- Otherwise Regulated Material: asbestos, car batteries, contaminated soil, and construction debris

#### 6.1.4 Bycatch discards of fish

Bycatch includes non-target marine organisms (non-target fin-fish, cetaceans, sea turtles, sharks, etc.), whether retained and sold or discarded (bycatch or incidental catch). Bycatch is a feature of virtually all fisheries and can sometimes be mitigated, but not totally avoided.

Both target catch and bycatch may be discarded. Discards are pernicious as they may represent a waste of edible fish. Moreover, discarded organisms are virtually never reported in the absence of observers, which results in a distortion of data used in stock assessment.

#### 6 1.5 Waste handling techniques

- Provide facilities for fish cleaning and carcass disposal.
- Provide a stainless steel sink equipped with a garbage disposal that is connected to a sanitary sewer. (Note: fish heads, large carcasses, and fish skin will clog up the disposal.)
- Provide garbage containers for fish carcasses.
- Empty garbage containers regularly (especially on hot days).
- Prohibit fish cleaning outside of designated areas.
- Implement fish composting where appropriate.
- Use a grinder to make chum out of fish carcasses. Sell the chum at your store.
- Arrange for crabbers to take fish carcasses.
- Prohibit fish cleaning at your marina.
- Educate people on the water quality problems associated with excess fish waste in lake waters.
- All hazardous waste should be sent to a disposal facility that is permitted, licensed, or registered by the state to dispose of hazardous waste.



**Diagram 6.1: Techniques waste disposal**

## 6.2 Handling, transporting tools, materials and equipments

- Materials ,tools and equipments required to handle and transported properly .
- It requires to use guidance for proper handlings and transporting.
- Muring transporting career should necessary for some fragile and toxic materials and equipments.
- Whenever we are going to our work area we have to handle and transport our equipment materials and tools safely.
- After completing our task we have to take them back to their place (store) safely without any damage on the equipment and ourselves by cleaning and maintaining if necessary.
- Materials should handle in a good manner
- Put the same material on the same area don't mix with other
- Transport carefully for fragile and toxic material

[https://www.youtube.com/watch?v=4XFEwVSG\\_rc&t=4s](https://www.youtube.com/watch?v=4XFEwVSG_rc&t=4s) /Accessed date 18/1/2023

## 6.3 Reporting difficulties and completing workout come

### 6.3.1 Definition of reporting

Report may be defined as a formal statement describing a state of affairs or what has happened. It has detailed description of a problem or a situation, findings of an investigation and recommendations or actions taken.

There are many difficulties that may encounter in work place fishing activities

Some of them are:

- Temperature too cold and too hot temperatures require modification
- Disease out breaks/ disease transmission
- Insufficiency of working facilities
- Contaminations (feed, water)
- Predator's problem
- Theft and the others should be properly reported.
- Problems or difficulties in completing work to required standards or timelines are reported to supervisor.
- Any problems or difficulties which will happen while we are accomplishing our farming activities have to be reported to supervisor or manager by the required standards or timelines.
- But before reporting we have to do our best to control the problems.

Some of the important parameters used to report problems or difficulties

- The place, time and location of the farm
- The name and job title of person injured in the incident
- Name of witness
- A brief description of the incident
- An event which preceded the incident
- Possible measures/recommendations/ to reduce similar incidents
- Name of a person who investigated the incident



Self-Check – 6	Written test
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Name..... ID..... Date.....

**Directions:** Answer all the questions listed below.

**Test I: Multiple choices**

- One is **false** statement about handling and transporting tools, materials and equipments;
  - After completing our task we have to take them back to their place
  - Materials should handle in a good manner
  - Put the same material on the different area and mix with other
  - Transport carefully for fragile and toxic material

**Test II: Short Answer Questions**

- List some difficulties that may encounter in work place fishing activities?
- What are the important parameters used to report problems or difficulties?
- Define waste?

## Operation Sheet - 6

### Applying waste material disposal and handling.

#### A. Tools and equipment's

- Brush room
- Wheelbarrow
- Over all
- Boot
- Hand glove
- Mask

#### B. Procedures/Steps/Techniques

- Wear appropriate PPE
- Identify wastes
- Evaluate waste
- Manage wastes

<b>LAP TEST-6</b>	<b>Performance Test</b>
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Name..... ID.....

Date.....

Time started: \_\_\_\_\_ Time finished: \_\_\_\_\_

**Instructions:** Given necessary templates, tools and materials you are required to perform the following tasks within **1** hour. The project is expected from each student to do it.

**Task:** Apply waste material disposal and handling.

## Reference Materials

### Books:

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Smith, A.R. 1999. *Monitoring, control and surveillance in developing countries and the role of FAO. Proceedings of the International Conference on Integrated Fisheries Monitoring*. Sydney, Australia, 1-5 February 1999. FAO, Rome. 378 pp.

### Web addresses

- <https://www.youtube.com/watch?v=mXO93Z8A9dg> /Accessed date 17/12/2023/
- <https://www.youtube.com/watch?v=nvhmg9l7PVw> /Accessed date 17/1/2023
- <https://www.youtube.com/watch?v=FWX7fnh6oYo> /Accessed date 17/12/2023
- [https://www.youtube.com/watch?v=qnPJ3\\_0ZQRA](https://www.youtube.com/watch?v=qnPJ3_0ZQRA) Accessed date 17/1/2023
- <https://www.youtube.com/watch?v=4QWfdbquowA> Accessed date 17/1/2023
- [https://www.youtube.com/watch?v=4XFEwVSG\\_rc&t=4s](https://www.youtube.com/watch?v=4XFEwVSG_rc&t=4s) /Accessed date 18/1/2023

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