

POSTLARVAL FISH CAPTURE AND GROW-OUT



Australian Government

Australian Centre for
International Agricultural Research



POSTLARVAL FISH CAPTURE AND GROW-OUT

A practical guide to catching and rearing reef-fish and
crustaceans for the aquarium trade

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and Ronnie Posalo**

Illustrated by Kisi Mae



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International Agricultural Research**

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PART 1 - INTRODUCTION

BACKGROUND

People of the Pacific islands have been exporting marine animals to the international aquarium trade for many years. They mainly trade in colourful, pretty coral reef-fish (such as butterflyfish, angelfish, triggerfish), corals and clams. Fish and other animals are collected by divers and sold to countries such as the United States, Japan and Europe, where they are kept in tanks for people to look at and enjoy.

This manual is about a new method for Pacific islanders to catch valuable fish and crustaceans (lobster and shrimp) to supply the aquarium trade. This new method is called 'capture and grow-out' and it involves three steps: 1) catching fish and crustaceans in their postlarval state, 2) growing, or rearing, them to a marketable size and 3) selling them for profit. This manual will explain the stages involved in setting up a 'capture and grow-out' operation and will help you decide if this business is right for you and your community.

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IS THIS BUSINESS RIGHT FOR YOU?

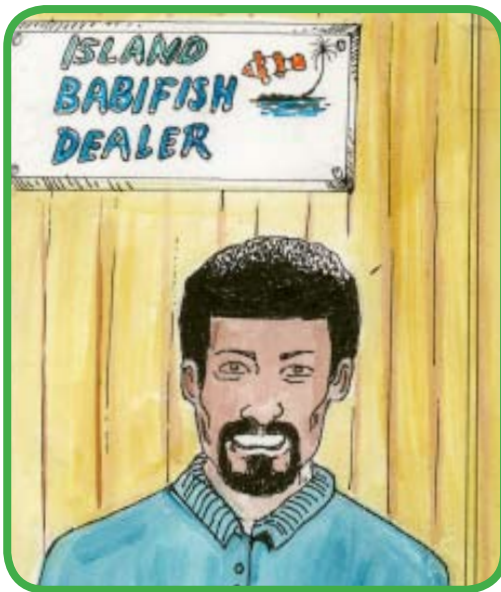
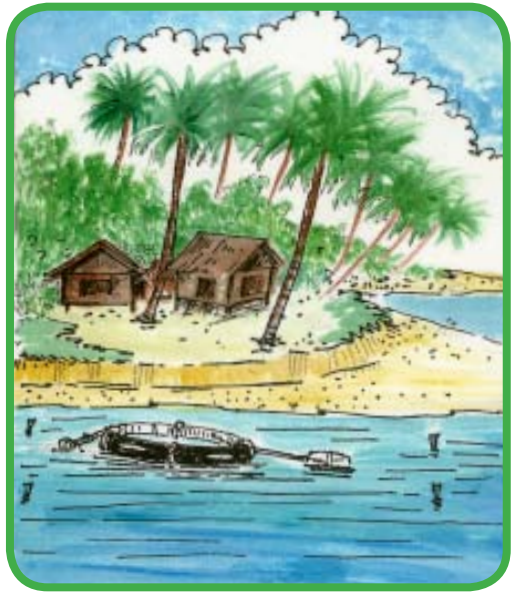
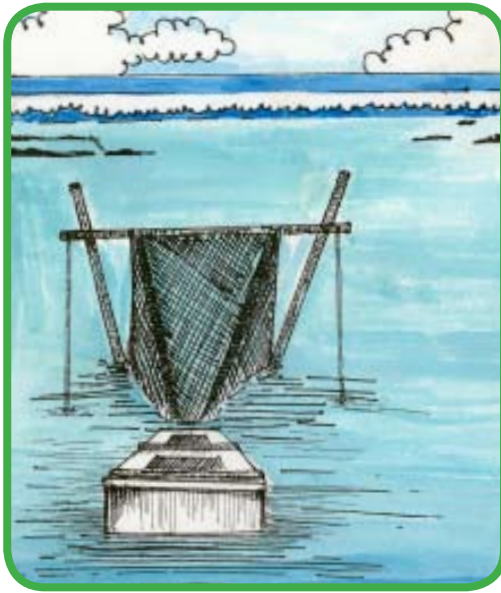
You will need to have the right kind of reef close to your village.
Use the checklist below to see if your reef is suitable.

GOOD REEF

- ✓ One-way water flow from the sea into a lagoon area
- ✓ Shallow (or dry) at low tide and up to 1.5 m deep at high tide
- ✓ Close to your village and easy to visit every day

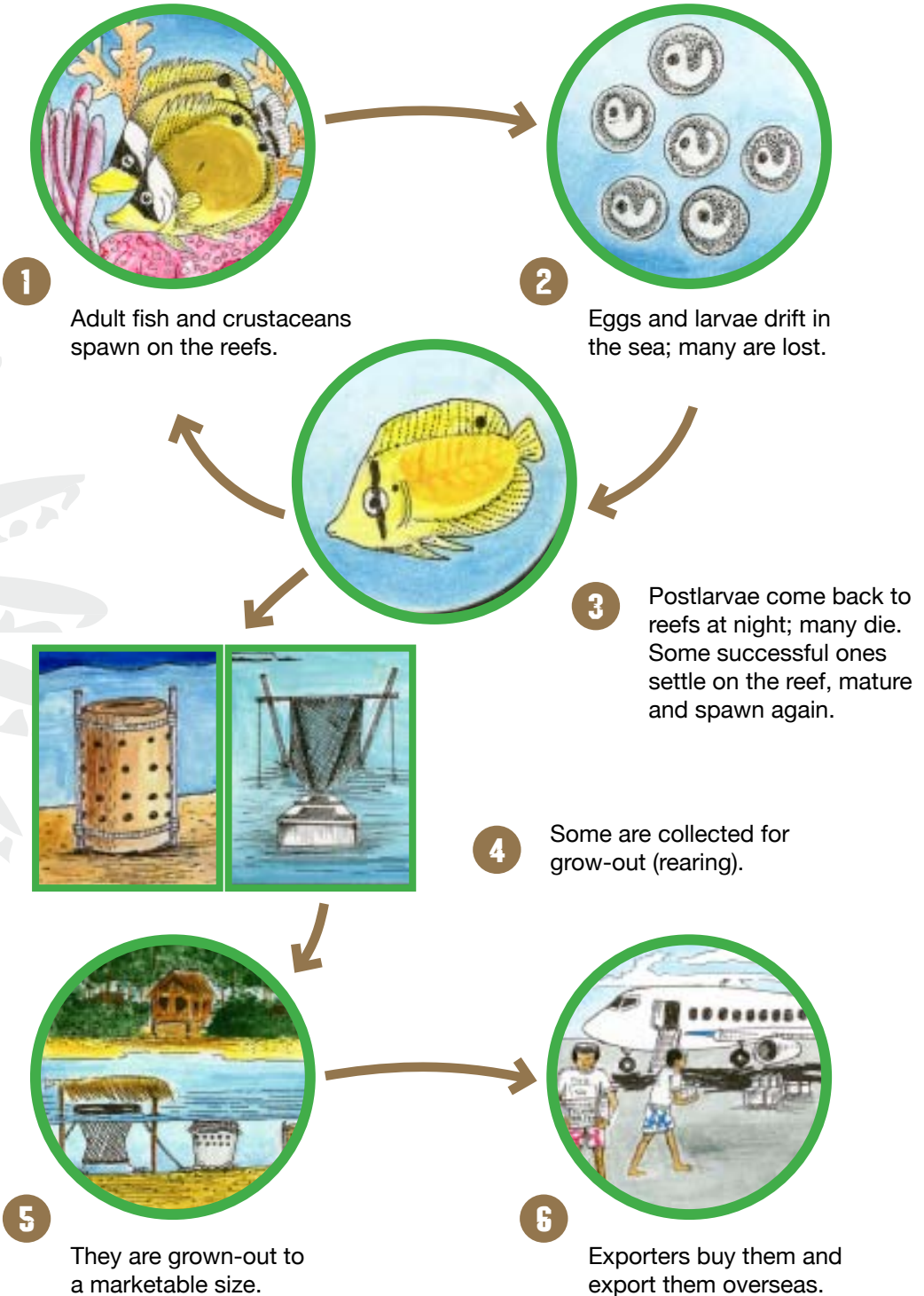
BAD REEF

- ✗ Adjacent to the shore (i.e. fringing reef) where water flows over the reef and hits the shore, then returns back over the reef again (i.e. two-way flow).
- ✗ Deep water over the reef with live coral and seaweed growth
- ✗ Far from village



In addition to a suitable reef you will also need calm, clean water near your village for your grow-out area and an exporter to buy your marine animals.

LIFE CYCLE OF FISH AND THE 'CAPTURE AND GROW-OUT' METHOD





IS THIS METHOD SUSTAINABLE?

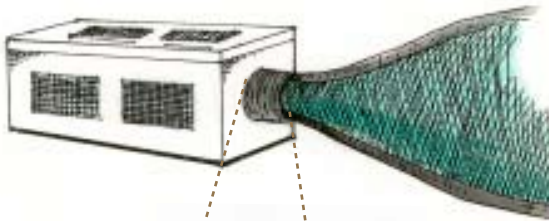
Postlarval coral reef animals are in their final stage before becoming a juvenile fish. At this stage, they return to the reef after drifting in the open sea. Postlarval animals are vulnerable at this stage and many will die during their first few days on the reef if they are unable to find a home or get eaten by larger fish. So, it is sustainable to catch some of these animals at this very early stage as many of these captured fish would have simply died if left to fend for themselves.

PART 2 - CAPTURE

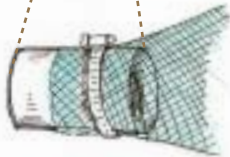
HOW TO MAKE A NET AND HOLDING BOX

You will need these things to make a net to catch fish, lobsters and shrimp on shallow reefs:

Fish holding box (see page 13)
sealed container that retains water, 3-mm mesh inserts on top and sides



Clip
to attach net
to box



Net frame
made from wood



Net
3-mm mesh, mouth
1 m x 1.5 m, tapering to
10 cm at box entrance

Rope



Wire
8-gauge



Rebar pegs
20-mm rough
rebar pegs cut into
50-cm lengths (for
hard reef) or up to
1-m lengths (for
soft reef)



Front support
star picket or
20-mm rough rebar,
1.5 m long

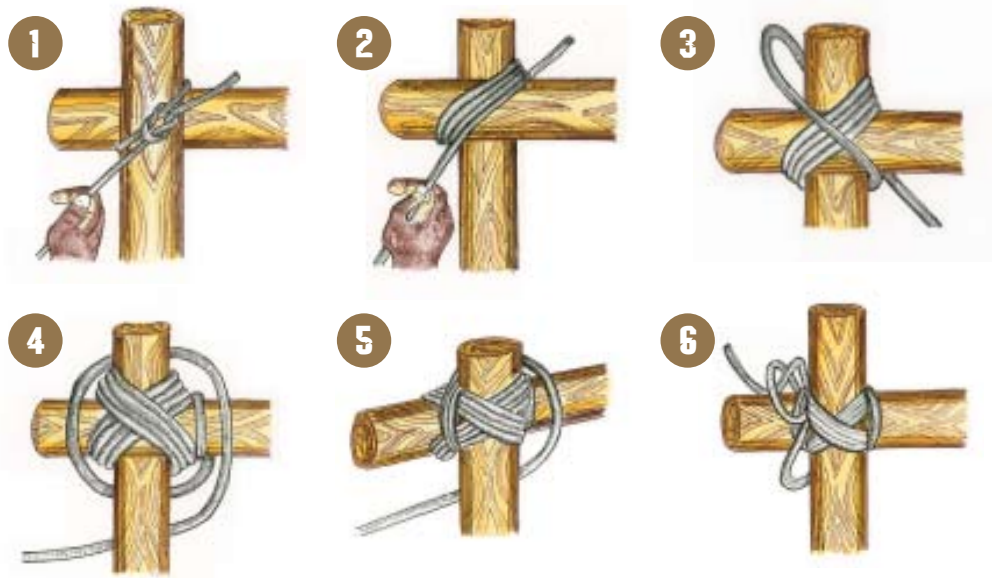




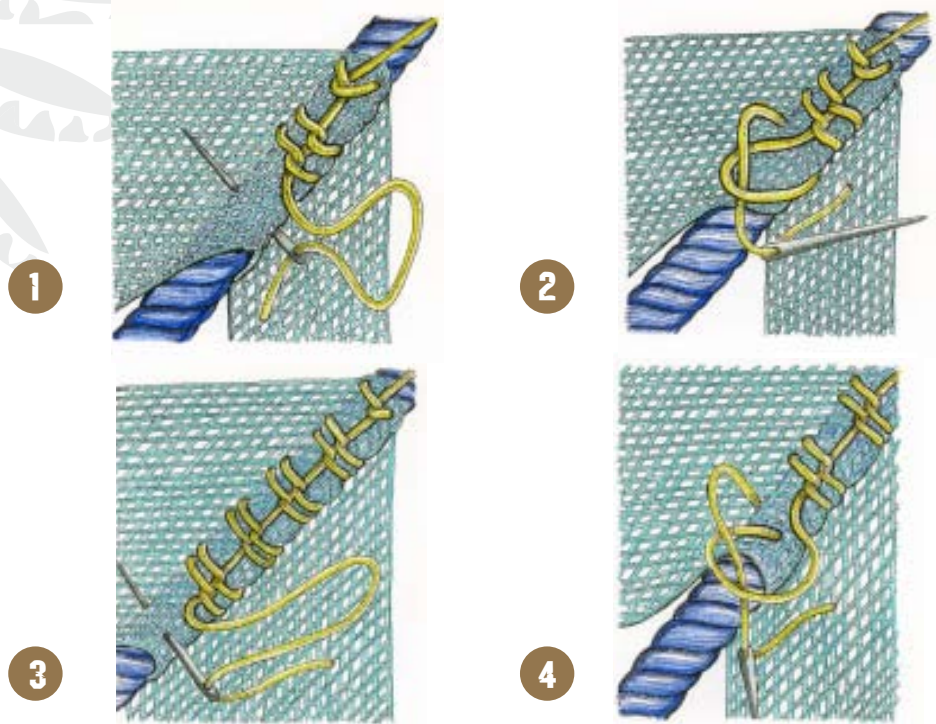
METHOD

- 1 Cut your pieces:
 - 4 lengths of wood, 2 x 1.5 m and 2 x 1.2 m
 - 2 pieces of netting 1.5 m wide by 3 m long, tapering to 10 cm wide at one end (horizontal panels)
 - 2 pieces of netting 1 m wide by 3 m long, tapering to 10 cm wide at one end (vertical panels)
 - 4 lengths of rope 3 m each.
- 2 Create a frame from your wood pieces using the method shown on page 12.
- 3 Attach ends of all 4 pieces of rope and wide mouth of netting pieces to frame, using the stitching method shown on page 12.
- 4 Hold frame up by tying extra ropes from it to two supports (such as trees) as shown in the picture above.
- 5 Stitch one horizontal netting panel to one vertical netting panel lengthways along a piece of rope using the stitching method shown on page 12. Repeat using remaining two net pieces.
- 6 Stitch the four panels together to create a net like the one in the picture above.

The frame for the net is lashed together as shown below.



Use this stitch to attach the netting securely to the rope and net frame. Use strong twine and stretch the net tight when stitching, ensuring the weave in the net is kept open.



This is one way to make a box that will hold your captured animals. It could be bigger or smaller depending on the materials you have available.

Mesh window
Plastic mesh windows on sides and top of box (600 x 180 mm)

Plastic or timber strips (25 mm wide, 6 mm thick)

Screws (6-gauge)

Lid (lower view)
Timber strips (50 x 25 x 800 mm)
Timber strips (50 x 25 x 350 mm)

Sides
Plywood back and front panels (400 x 400 x 12.5 mm)
Plywood side panels (800 x 400 x 12.5 mm)

Lid (upper view)
Timber strips (50 x 25 x 550 mm)
Plywood (800 x 400 x 12.5 mm)

PVC pipe (150 mm diameter, 175 mm long)

Base
Plywood (800 x 400 x 12.5 mm)
Base protection timber strips (50 x 50 x 800 mm)
Nails, galvanised (25 mm, 1-kg pack)

Net attachment 8'' Jubilee clips (hose clamps) x 2

PVC strip (150 mm diameter, 175 mm diameter when cut open)

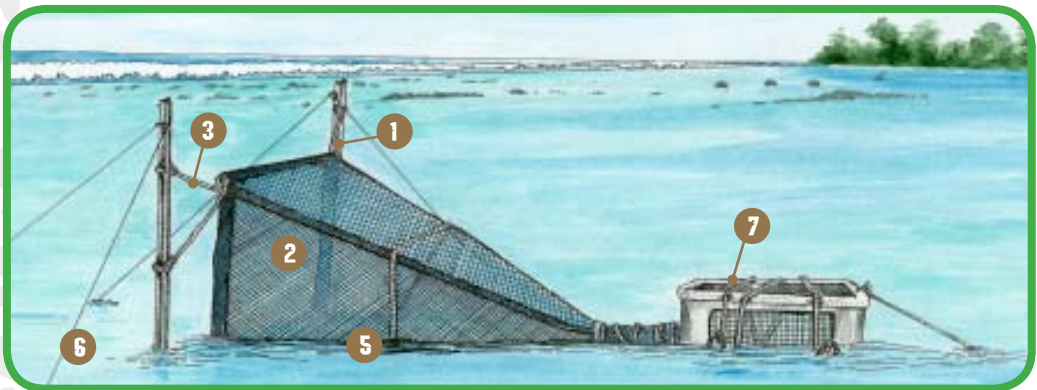
In addition to these materials, you will also need: 1 litre of adhesive contact glue, 1 tube of silicon, 1 litre of white marine paint, 1 litre of black marine paint.

Once your box is finished, seal the joints with silicon and paint the box white on the outside (to reflect sunlight and keep the box cool) and black on the inside (to help captured animals feel safe and avoid becoming stressed).

HOW TO PLACE YOUR NET AND HOLDING BOX

Your net and holding box need to be positioned and secured to the reef at low tide. Set them back from the breaking waves where the water flow is strong. Face the mouth of the net toward the waves so animals can flow easily into the net. Make sure the net and box are tied down tightly as waves can be strong and destructive. Place a large rock in the box to give captured animals a place to hide. Choose a rock that is fairly smooth so fish and crustaceans do not get stuck in the holes.

- 1 Support posts
- 2 Net frame
- 3 Rope tie
- 4 water flow
- 5 Net base, flat on reef floor
- 6 Fencing wire
- 7 Rebar pegs and rope attach the box to the reef



Your net and holding box should look like this at low tide.



Your net and holding box should look like this at high tide.

WARNING: the reef crest can be dangerous if the sea is rough. During storms and rough weather, remove your nets and wait for conditions to calm down before fishing again. Fishing during rough seas will break your nets and could lead to personal injury.

NIGHT

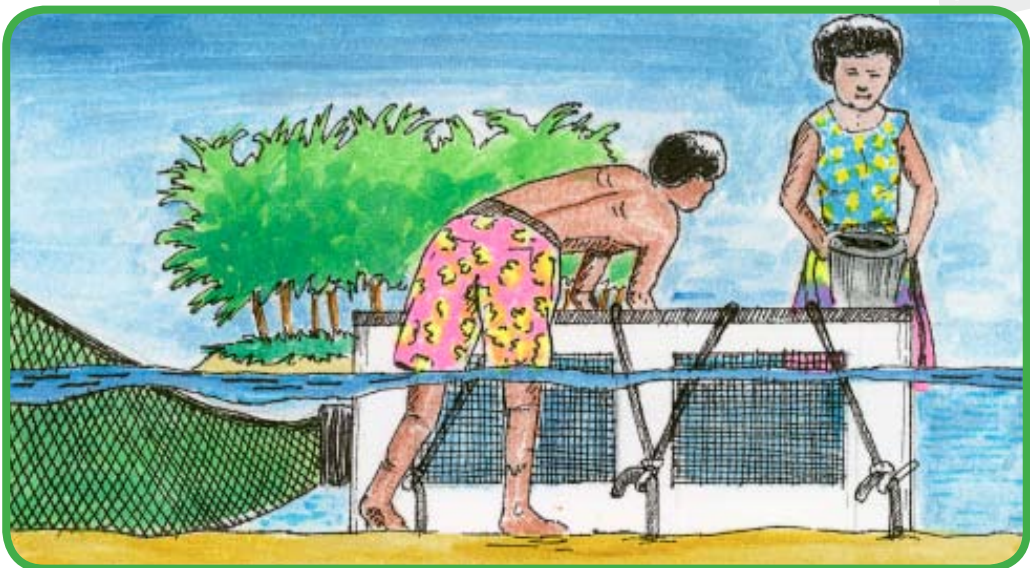
The net and holding box collect marine postlarvae at night when water flows into the net.



DAY

The catch is ready to be picked up at low tide the next day.

When accessing your holding box, make sure the water is below the top of the box to make it easier to remove your catch and prevent it from escaping.

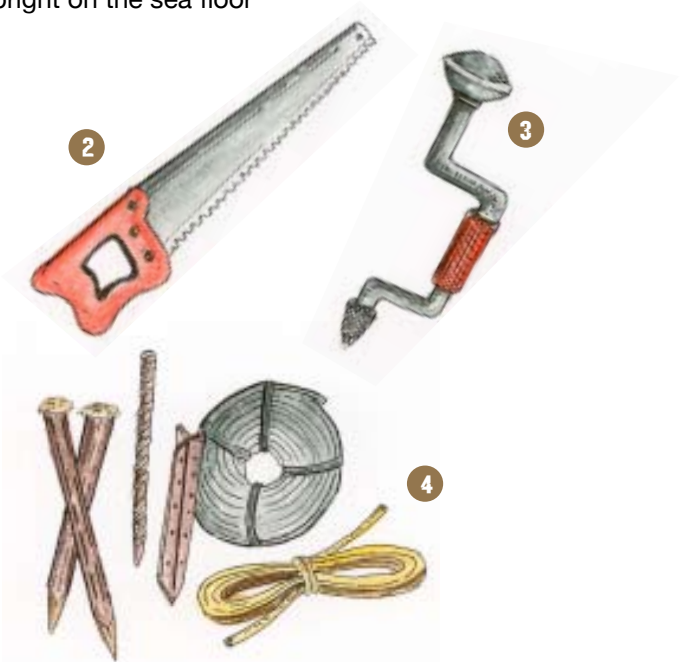


HOW TO MAKE A LOBSTER CAPTURE LOG

Coconut logs drilled with holes are a cheap and simple way to catch postlarval lobsters.

You will need these things to make a log to catch lobsters in shallow, non-reef areas:

- 1 Pieces of old coconut log (as fresh wood can grow mould)
- 2 A hand saw to cut the log into 1-m lengths
- 3 A hand drill to make holes in the logs
- 4 Pegs and rope to secure the logs upright on the sea floor

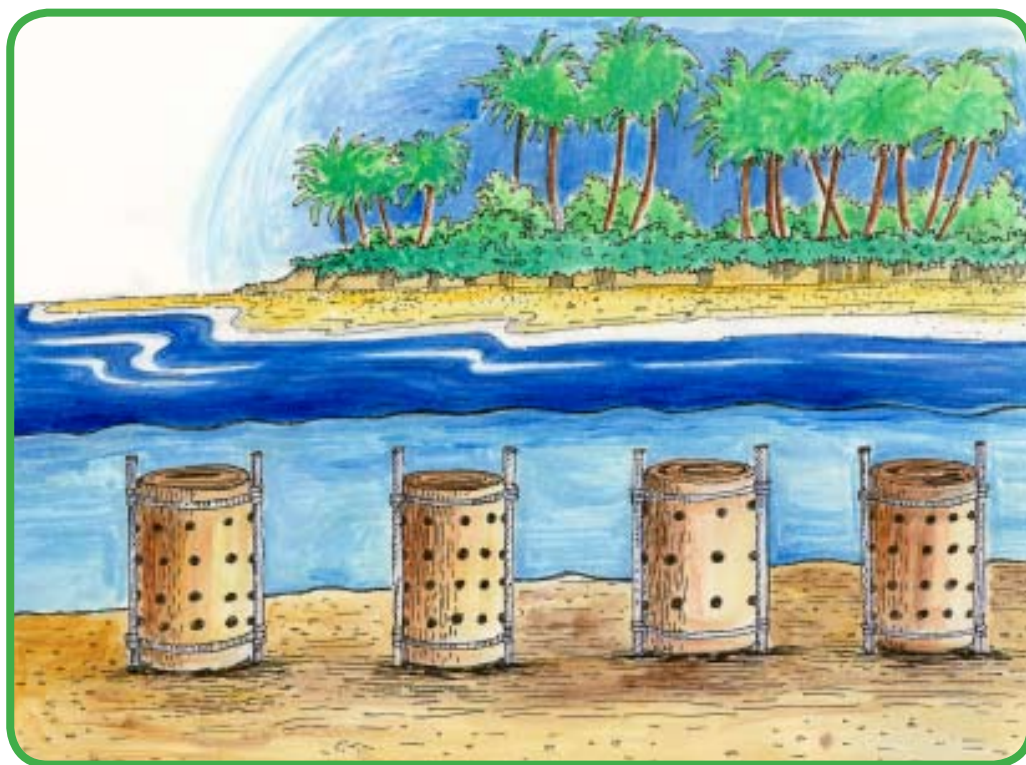


Drill 20-mm wide by 40-mm deep holes all over the logs. You should be able to just fit your finger in up to the second joint.



HOW TO PLACE YOUR LOBSTER CAPTURE LOG

Select a shallow non-reef area with a sandy sea floor, such as behind the reef flat or anywhere else you see small lobsters. Secure the logs with stakes and ropes. Avoid coral and other natural lobster habitat as you have a better chance of catching lobsters in your logs if there is limited natural habitat nearby.



PART 3 - LOOKING AFTER YOUR CATCH ('GROW-OUT')

HOW TO HANDLE AND TRANSPORT CAPTURED REEF ANIMALS

Your captured marine animals need to be handled carefully and correctly transported back to your grow-out area so they do not become stressed or damaged.



FISH

Check the holding box for fish and lobsters every morning. To remove them, scoop them up individually in a fine mesh net. Cup water in your hand and place it underneath the net to keep the fish wet. Place them immediately into a bucket of clean sea water.

LOBSTERS

Check the logs for lobsters every morning. Postlarval lobsters will look clear like glass with white feelers, which you will see sticking out of the holes in your log. To remove lobsters, gently hold both feelers between your thumb and forefinger and gently pull them from the hole. Place them immediately into a bucket of clean sea water. Do not leave lobsters in the logs for more than a day. They are harder to remove and you are more likely to damage them.



SHRIMP

Scoop shrimp out of the holding box with small jars filled with clean sea water. Transport each shrimp in its own jar floating in a bucket of clean sea water.

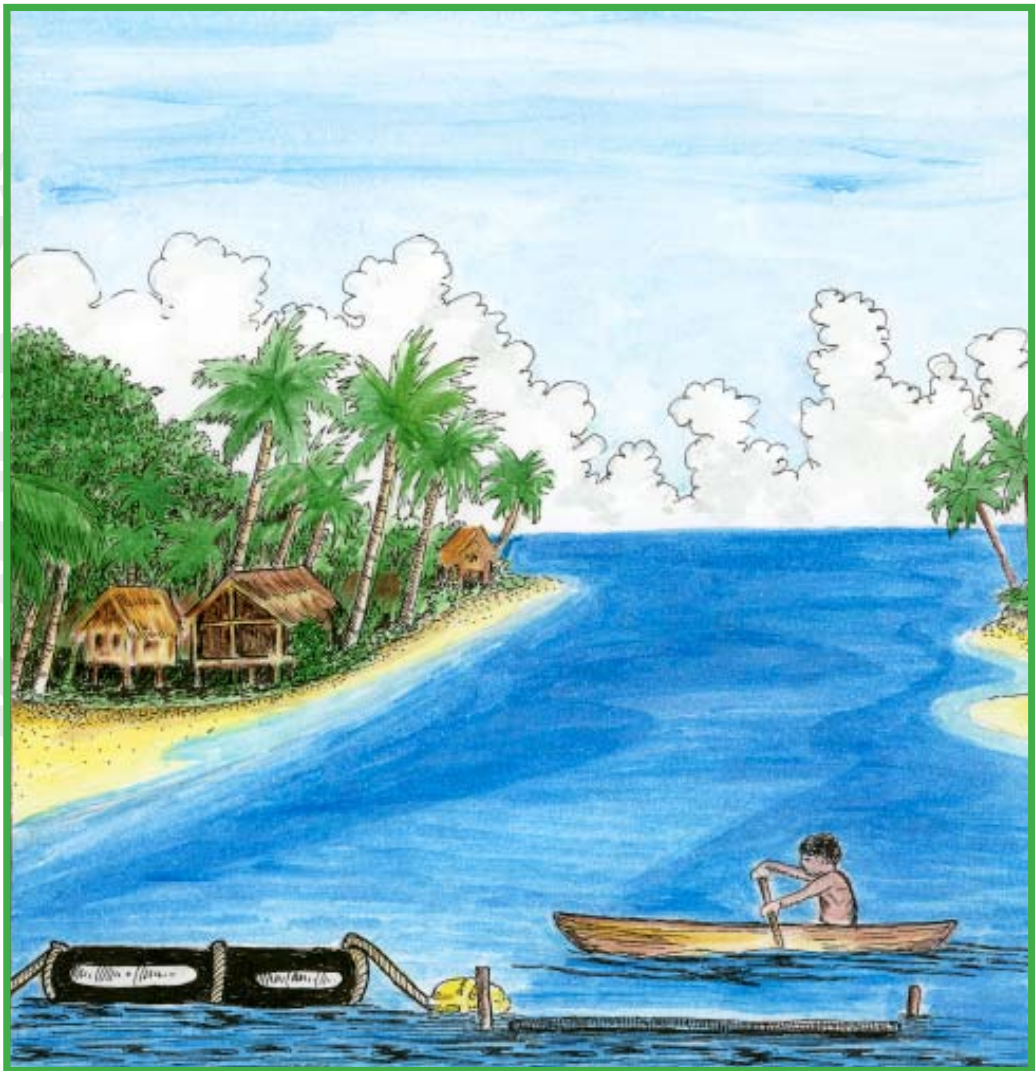


If the transport period is long, stop and change the water holding your marine animals to prevent it from getting too hot, cold or dirty.

HOW TO PLACE YOUR GROW-OUT NET

After capture, you must keep your fish, shrimp and lobsters alive and healthy until they are big enough to sell.

The best places for grow-out are shallow, protected areas near your home, with a depth of about 1 m at low tide, good water flow, and no strong currents.



THERE ARE THREE GROW-OUT SYSTEMS YOU MIGHT USE:



- 1 Fish cages (floating or fixed)
- 2 Shrimp jars
- 3 Lobster buckets

HOW TO LOOK AFTER YOUR CAPTURED SHRIMP

1 Shrimp are grown in containers that are kept under water at all times in the sea on lines or in bags.



2 The best containers are plastic and have a screw-top lid. Make sure your containers are either dark or painted dark with black marine paint. This will prevent algae from growing on shrimp.

3 Drill holes all over the top half of the container so water can flow in and out. Make sure these holes are cleaned regularly.



4 Place each shrimp in its own container as they will fight when kept together.

5 Feed them a tiny amount of chopped raw fresh fish or shellfish in the morning and afternoon.



6 You must remove leftover food and moulted skins from the jar every day.

HOW TO LOOK AFTER YOUR CAPTURED LOBSTERS



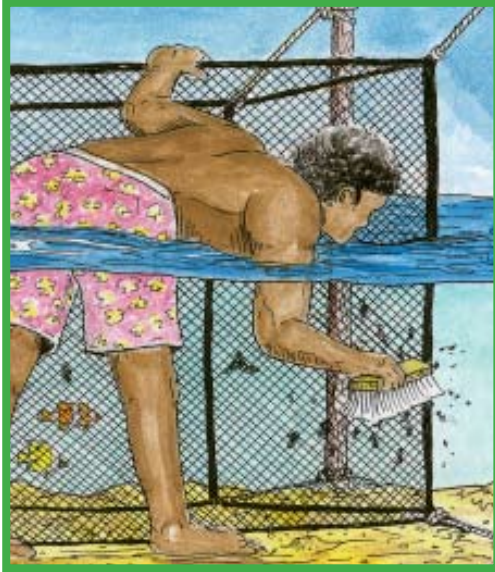
- 1** Lobsters are grown in plastic buckets with holes in them and mesh lids.
- 2** Place containers securely in water deep enough to keep them under water at all times, even at low tide.
- 3** Place some large stones (the size of two of your fists) collected from the reef crest into each container. Remove any crabs or other animals from stones before using. Make sure there are spaces between the stones for your lobsters to move around.
- 4** You may keep more than one lobster in each container. However, make sure it is not too overcrowded.
- 5** Feed your lobsters daily with a small amount of chopped raw fresh fish or shellfish. Only lift up a corner of the lid to add food to prevent your lobsters escaping.
- 6** Keep the mesh cover and sides of the bucket clean so that sea water can circulate.

HOW TO LOOK AFTER YOUR CAPTURED FISH

- 1** Fish are grown in cages made of 3–4-mm netting. Cages can be floating or fixed, as long as the bottom part is always under water and the top of the cage is always out of the water (so fish cannot escape).

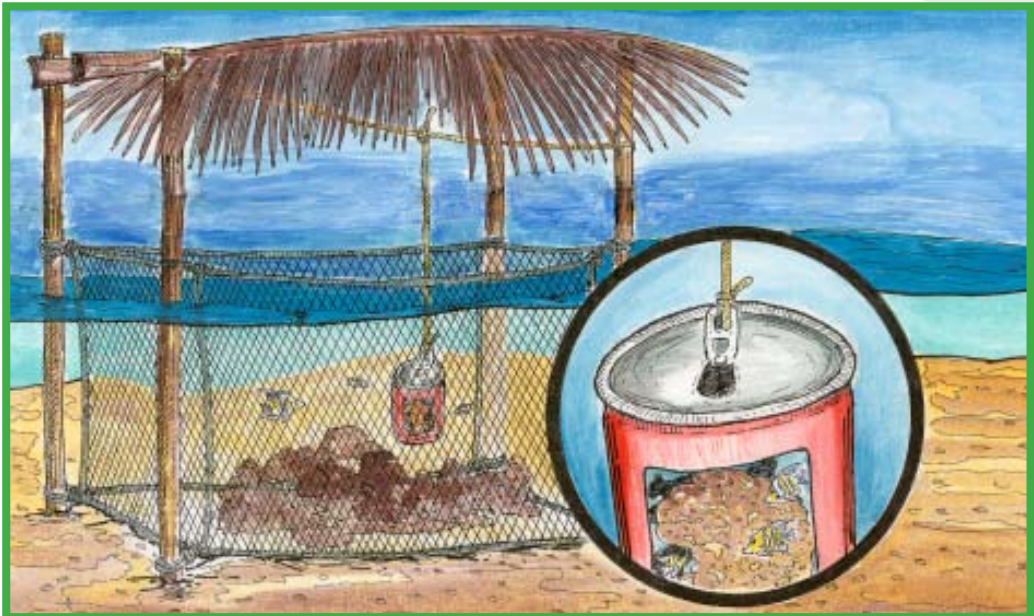


- 2** Feed fish in the morning or afternoon with finely chopped raw fresh fish, shellfish or fish eggs. Add the food slowly, leaving a couple of minutes between each addition. This gives the fish time to feed before the food falls out through the bottom of the cage.



- 3 Clean the cage regularly but leave some algae on the mesh. Your captured fish will enjoy eating them as well as the small animals that the algae attract.

- 4 Provide a house for your fish to hide in by hanging a tin can with a hole in it in the cage. Place some rocks or coral in the can to weigh it down and encourage fish to use it.



PART 4 - EXPORT

WHEN ARE LOBSTERS AND SHRIMP READY FOR EXPORT?

Exporters will pay money for colourful crustaceans such as painted lobsters, banded cleaner shrimps and anemone shrimp. You will need to discuss with your fish exporter what species they like to buy and what size will provide the best profit for you.

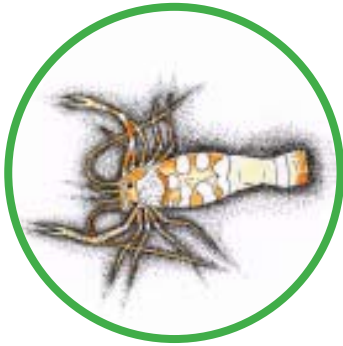
Lobsters are ready for sale and export after 3–4 weeks. At this point, they are about 10 cm long from the tip of the feelers to the end of the tail. Lobsters should have all their legs, and their feelers should not be broken. They should also be a nice bright blue and white colour.

**PAINTED LOBSTER
SHOWING INCREASING
COLOUR BRIGHTNESS
WITH AGE**



First few days

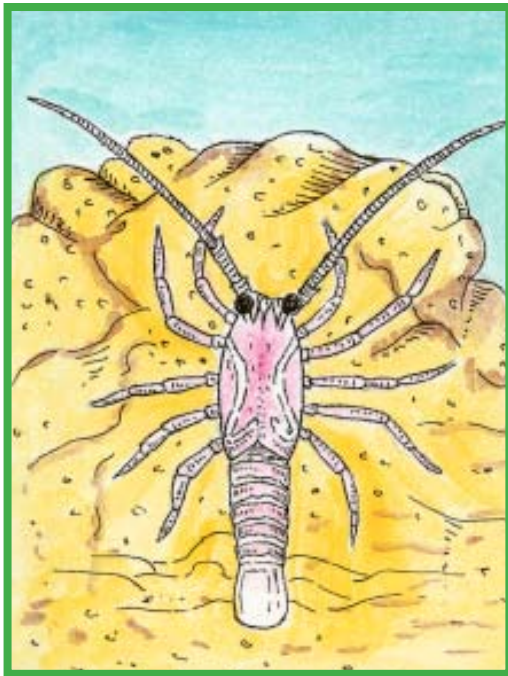
The common banded cleaner shrimp (the red and white variety) should be ready for sale and export after 4 weeks. At this point, they are about 4 cm long from the eyes to the tip of the tail. Other banded cleaner shrimps, such as the yellow- and blue-headed varieties, grow more slowly. They will be ready for sale and export after about 6–8 weeks when they have grown to 3 cm. Shrimp should have all their legs and claws and should be a bright colour.



Anemone shrimp



Common banded cleaner shrimp



After 3 days



6 days onwards

WHEN ARE FISH READY FOR EXPORT?

Fish grow more slowly than shrimp and lobsters. Most will take 2–3 months before they are ready to be sold. A fish is ready for export when it has developed nice bright colours. The fish should be feeding and look well fed. It should not have any scars, damaged fins or marks on its body.

Exporters will pay money for colourful, pretty fish such as butterflyfish, angelfish, triggerfish, pufferfish, tobies, batfish, anglerfish, lionfish, surgeonfish and tangs. You will need to discuss with your fish exporter what species they like to buy and what size will provide the best profit for you.



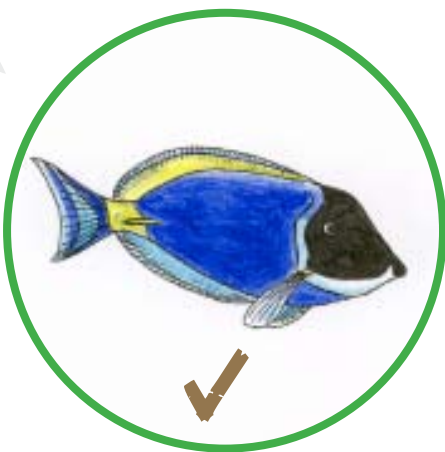
Toby



Butterflyfish



Triggerfish



Blue tang
(healthy)



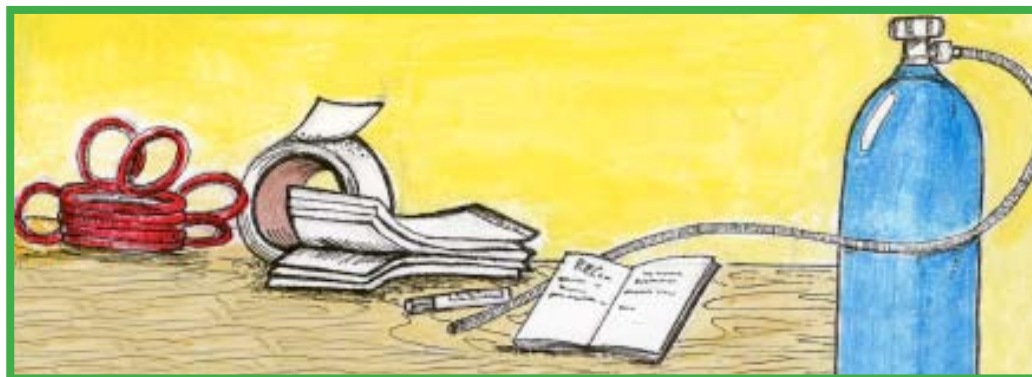
Blue tang
(damaged)

EXPORT CHECKLIST

When your fish, lobsters or shrimp are big enough to be sold and exported, you will need the following items:

- Plastic bags of varying sizes (the exporter should be able to provide these)
- A supply of clean sea water
- Industrial-grade oxygen bottle and rubber hose
- Elastic bands
- Packing cases (preferably styrofoam as these are light and waterproof)
- Packing tape
- Marking pen
- Notebook

DO NOT FEED YOUR FISH, LOBSTERS OR SHRIMP THE DAY BEFORE EXPORTING.



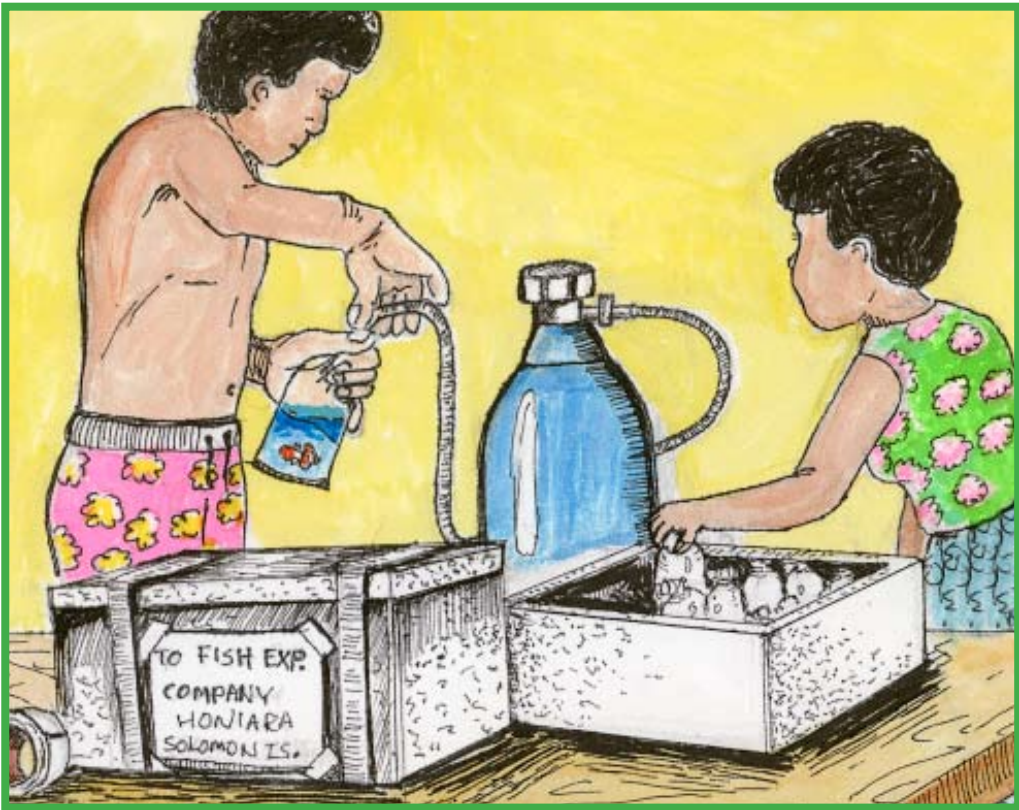
HOW TO PACK YOUR MARINE ANIMALS FOR EXPORT

- 1 Pack your marine animals in the shade or in the cool of the day to prevent the water in the bags from heating up and stressing or harming the animals inside.
- 2 Pack each marine animal separately. Make sure you have the correct bag size for your animal. The exporter can advise on this.



- 3 Take a plastic bag and partly fill it with sea water.
- 4 Use a small net or jar to transfer your marine animal into the bag.
- 5 Always handle marine animals gently and always keep your hands wet.
- 6 Squeeze the air out of the bag and then fill it with oxygen using the tube.





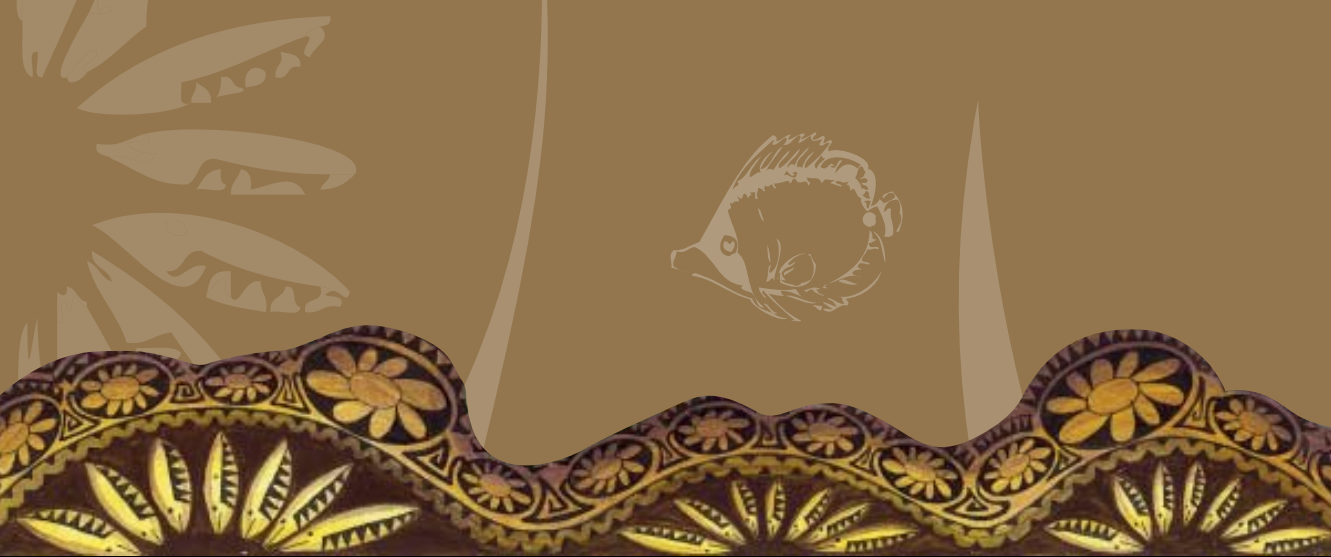
- 7 The bag should contain approximately one-third water and two-thirds oxygen.
- 8 Twist the top of the plastic bag firmly and fold it over itself to form a 'gooseneck'.
- 9 Tie the gooseneck tightly with an elastic band, ensuring that the oxygen does not escape from the bag.
- 10 Pack animals upright in a packing carton and seal it with tape.
- 11 Address the packing carton.
- 12 Write down a list of all the marine animals you are about to sell. Later, keep a record of how much you were paid for these animals.





**ALL THAT IS LEFT TO DO NOW
IS COLLECT AND ENJOY YOUR PROFITS.**

GOOD FISHING!



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