MACROALGAE

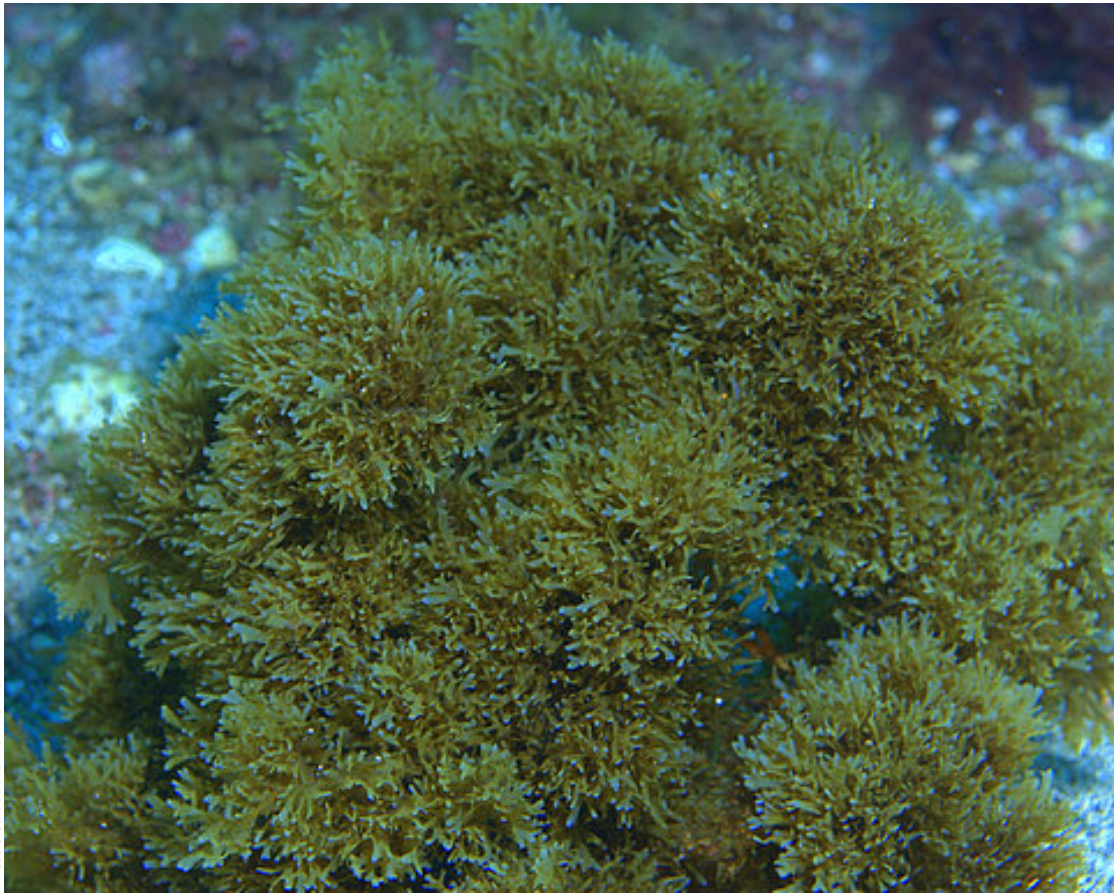


Photo credit Ed Bierman via Flickr.

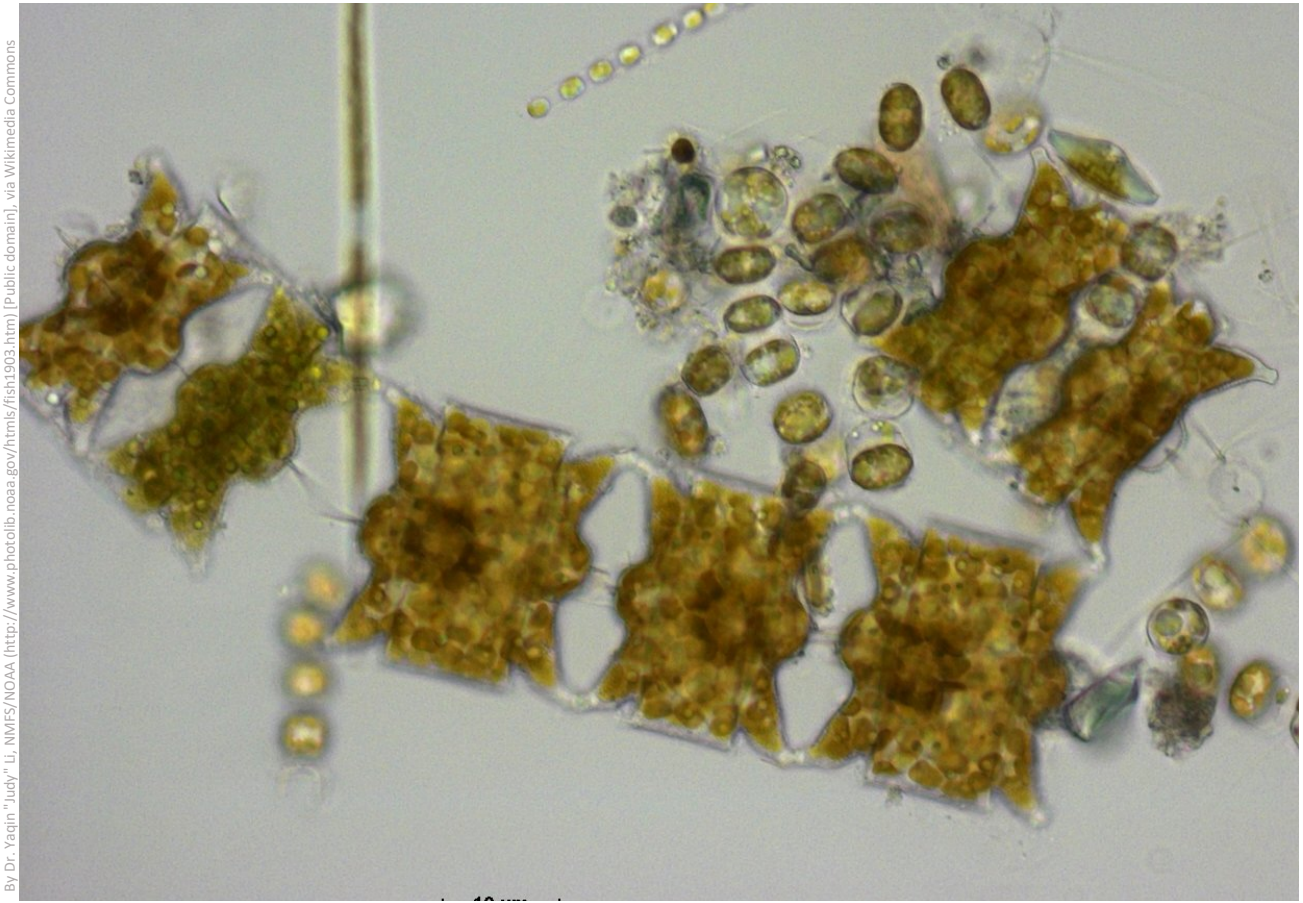
MACROALGAE

- Primary producers photosynthesize. They get their energy from the sun.
- These complex algae are always attached to the seafloor or hard surfaces like coral reef structures, rocks, shells and tree roots.
- Macro means large. So, *Macro*algae are large algae that can be seen with the naked eye, without a microscope!
- There are three main types of Macroalgae: Green (seaweed), Brown (kelp), & Red

Macroalgae eat: carbohydrates that they make from absorbing sunlight, oxygen and water

Macroalgae are eaten by: Black Sea Urchin, Princess Parrotfish, Blue Tang, Threespot Damselfish

PHYTOPLANKTON



By Dr. Yaqin "Judy" Li, NMFS/NOAA (http://www.photolib.noaa.gov/htmls/fish1903.htm) [Public domain], via Wikimedia Commons

PHYTOPLANKTON

- Primary producers photosynthesize. They get their energy from the sun.
- These photosynthesizers need sunlight to survive so they live by floating near the surface of the water and they use water currents to move from place to place.
- These are tiny plants that live in the ocean, you can't see them without a microscope!
- These tiny plants are the beginning of the food chain for most of the planet and produce nearly half of the world's oxygen that we breathe.

Phytoplankton eat: carbohydrates that they make from absorbing sunlight, oxygen and water

Phytoplankton are eaten by: Zooplankton, Barrel Sponge

SEAGRASSES

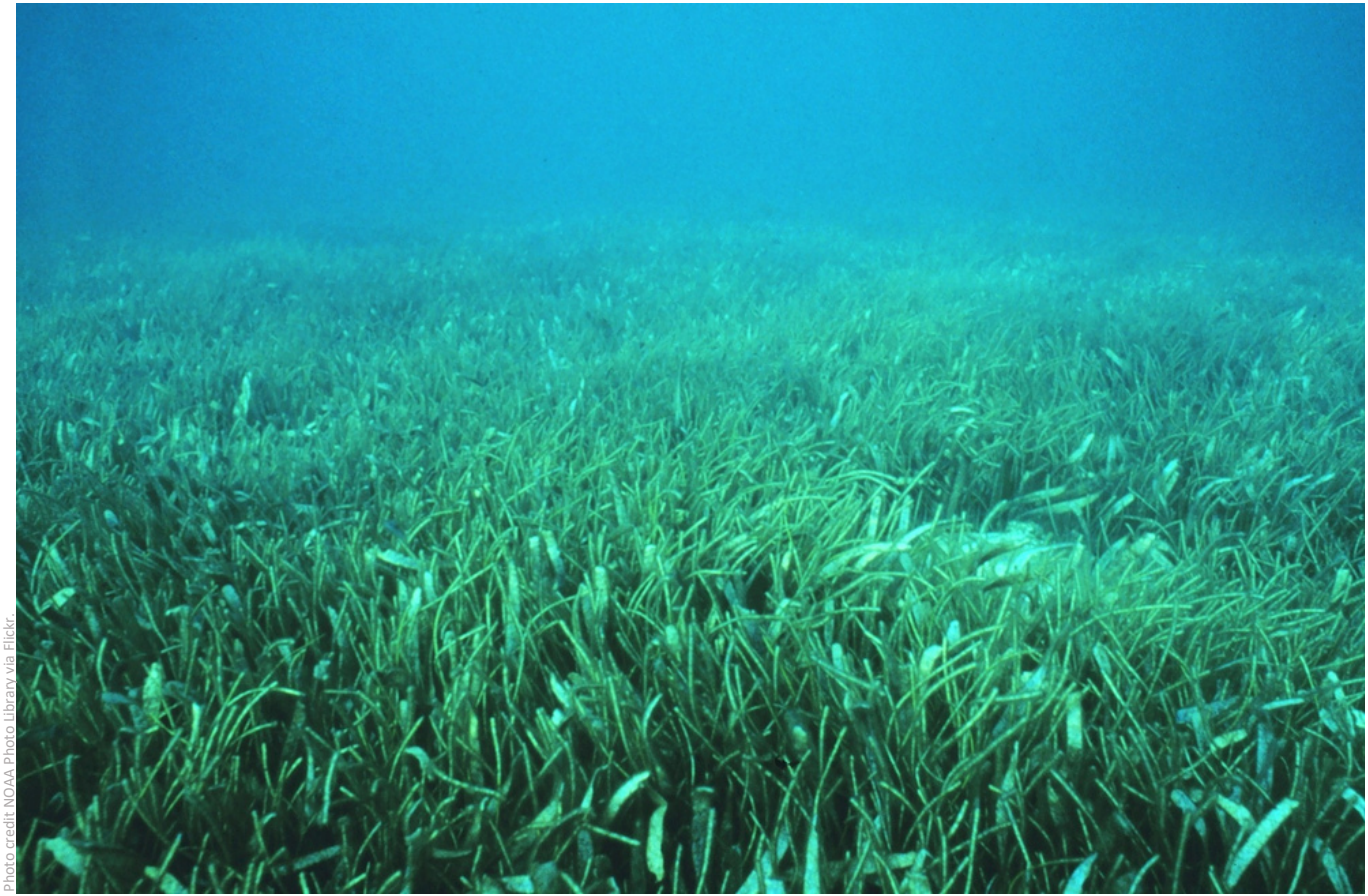


Photo credit NOAA Photo Library via Flickr

SEAGRASSES

- Primary producers photosynthesize. They get their energy from the sun.
- These plants need sunlight so they grow only in shallow water near the coast or in sheltered lagoons and estuaries.
- Sea grasses are different than seaweed because they are plants not macroalgae! They flower, grow like meadows, and have roots underwater.
- These plants serve as an important food source for many ocean herbivores, help stabilize the seafloor and also filter ocean water.

Sea Grasses eat: carbohydrates that they make from absorbing sunlight, oxygen and water

Sea Grasses are eaten by: Princess Parrotfish, Blue Tang

ZOOPLANKTON

ZOOPLANKTON

- Primary Consumers are Herbivores. They eat primary producers.
- These tiny animals eat phytoplankton (tiny plants), so they live near the surface of the ocean and use water currents to travel long distances.
- These are tiny animals that live in the ocean, you can't see most of them without a microscope!
- Some Zooplankton are larval or baby stages of larger animals, some are single-celled animals and some are tiny animals with hard skeletons (crustaceans).

Zooplankton eat: Organic material from decaying plants & animals, Phytoplankton & other planktons

Zooplankton are eaten by: Blue Chromis, Yellowtail Snapper, Gorgonians & Coral Polyps

BLACK SEA URCHIN

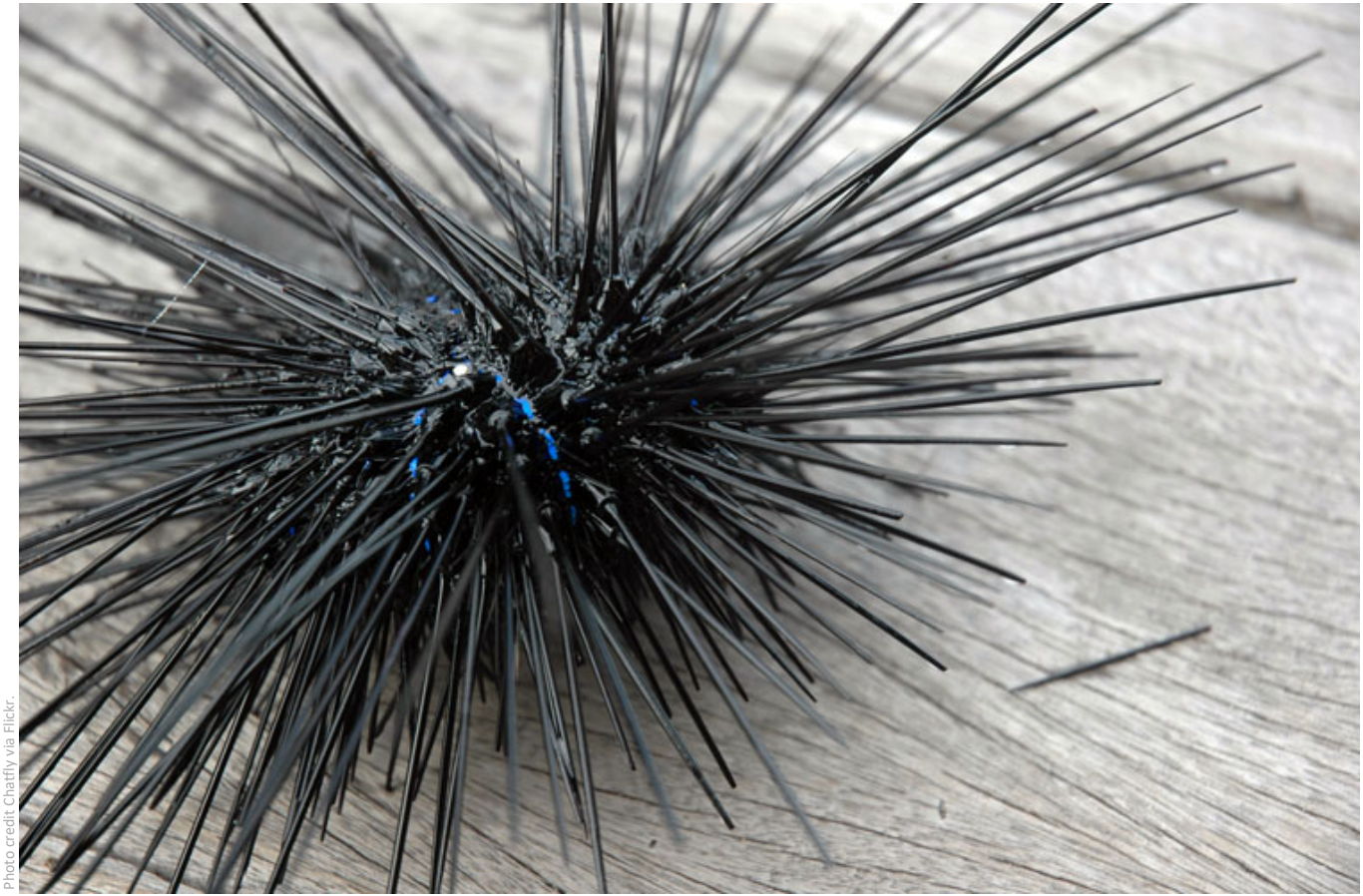


Photo credit Chatfly via Flickr.

BLACK SEA URCHIN

- Primary Consumers are Herbivores. They eat primary producers.
- These herbivores hide during the day under rocks and in small crevices on the reef then come out to feed at night, scraping algae off of hard surfaces.
- Sea urchins have hard, spherical bodies with long sharp spines to protect them from predators.
- Urchins are important herbivores in the oceans, without sea urchins, algae could completely overgrow coral reefs.

Black Sea Urchins eat: Macroalgae

Black Sea Urchins are eaten by: Hawksbill Sea Turtle, Caribbean Spiny Lobster

PRINCESS PARROTFISH

Photo credit Paul Humann.

PRINCESS PARROTFISH

- Primary Consumers are Herbivores. They eat primary producers.
- These herbivores swiftly swim over the reef during the day to feed and then hide in crevices at night sometimes forming a cocoon of mucous to sleep in.
- Parrotfish have beak-like teeth which they use to scrape algae and bits of coral off the reef then they then grind up the rock they eat in their bellies and poop it out as sand!
- The princess parrotfish has pink lines outlining its tail fin, like a skirt on a real princess.

Princess Parrotfish eat: Macroalgae, Sea Grasses

Princess Parrotfish are eaten by: Nassau Grouper, Gray Reef Shark, Great Barracuda, Green Moray Eel

BLUE TANG

Photo credit Paul Humann.

BLUE TANG

- Primary Consumers are Herbivores. They eat primary producers.
- These herbivores are often seen swimming in large schools which cruise over the reef and graze algae off of hard surfaces.
- Blue Tangs have a sharp spine at the base of their tail which they use for self-defense.
- As a baby the Blue Tang is actually yellow. As adults these blue fish can change their color from light blue to deep purple.

Blue Tangs eat: Macroalgae, Sea Grasses

Blue Tangs are eaten by: Nassau Grouper, Gray Reef Shark, Great Barracuda, Green Moray Eel

THREESPOT DAMSELFISH

Photo credit Paul Humann.

THREESPOT DAMSELFISH

- Primary Consumers are Herbivores. They eat primary producers.
- These fish live in holes and small crevices in the reef and will viciously guard their territory.
- These herbivores actually farm their algae. They will pick clean a hard surface so their favorite algae food will grow there and then they'll defend their "garden".
- The father Threespot Damselfish will aggressively guard his clutch of eggs which stick on the underside of rocks or hard surfaces.

Threespot Damselfish eat: Macroalgae

Threespot Damselfish are eaten by: Nassau Grouper, Gray Reef Shark, Great Barracuda, Green Moray Eel

BARREL SPONGE

Photo credit Carol Cox.

BARREL SPONGE

- Primary Consumers are Herbivores. They eat primary producers.
- Barrel Sponges grow everywhere on the reef, in deep and shallow water- they just need a hard surface to grow on. Some can grow large enough to fit a person inside!
- These *filter feeder* sponges eat by pumping the sea water around them through their interior and filtering & capturing tiny plants (like phytoplankton!) in their large opening.
- This ocean sponge isn't soft like the sponge in your kitchen. The Barrel Sponge has tiny pieces of glass or rock in their skeleton, making it hard.

Barrel Sponges eat: Phytoplankton, Organic material from decaying plants & animals

Barrel Sponges are eaten by: French Angelfish, Hawksbill Sea Turtle

BLUE CHROMIS

Photo credit Brad Gratwicke via Flickr.

BLUE CHROMIS

- Secondary Consumers are Carnivores. They eat herbivores.
- This small, bright blue fish is found swimming in the open water above reefs rather than among the corals and rocks.
- When frightened, the Blue Chromis will retreat into crevices in the reef.
- These *daytime* predators swim through the water during the day and pick out tiny animals called Copepods.

Blue Chromis eat: Zooplankton

Blue Chromis are eaten by: Nassau Grouper, Gray Reef Shark, Great Barracuda, Green Moray Eel

FRENCH ANGELFISH

Photo credit Laszlo Ilyes.

FRENCH ANGELFISH

- Secondary Consumers are Carnivores. They eat herbivores.
- During the daytime, these fish can be found cruising over the entire reef, biting off large chunks of sponges.
- Young French Angelfish act as important cleaner fish, keeping other fish clean by eating off bugs, dead scales, and illnesses (parasites).
- These fish swim together for life. As adults, male and female Angelfish appear in the same pairs for their whole lives and they can defend a territory the size of a football field!

French Angelfish eat: Barrel Sponges

French Angelfish are eaten by: Nassau Grouper, Gray Reef Shark, Great Barracuda, Green Moray Eel

YELLOWTAIL SNAPPER

Photo credit Janna Nichols.

YELLOWTAIL SNAPPER

- Secondary Consumers are Carnivores. They eat herbivores.
- This fish can be found in the upper water column above the reef where they often school together and interact with humans if you get close enough.
- These carnivores feed at night on crabs, shrimp, small fish and worms.
- Yellowtail Snapper can survive up to 14 years in the wild if they avoid predators like sharks and barracudas.

Yellowtail Snappers eat: Zooplankton, crustaceans, shrimp, small fish, worms

Yellowtail Snappers are eaten by: Gray Reef Shark, Great Barracuda, Green Moray Eel, People

GORGONIANS & CORAL POLYPS

Photo credit amanderson2 Flikr.

Photo credit NOAA Photo Library Flikr.

Photo credit Paul and Jill via Flickr.

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GORGONIANS & CORAL POLYPS

- Secondary Consumers are Carnivores. They eat herbivores.
- Without Gorgonians & Coral Polyps none of these other animals would have a home! The coral reefs these organisms build support lots of other fish.
- Gorgonians include soft corals, like sea fans and sea whips. These corals attach to hard rocks and sway with the currents to catch their prey.
- Coral polyps are the individual tiny animals that live within all corals on the reef. The polyps have 6 (hard corals) or 8 (gorgonians) tentacles that they use to capture microscopic animals like Zooplankton!
- Even though Coral Polyps have tentacles, they also have tiny algae called zooxanthellae inside of those tentacles. These algae can photosynthesize to get energy from the sun which they give to the corals in exchange for a place to live (within the polyps!). This is called symbiosis.

Gorgonians & Coral Polyps eat: Zooplankton, Phytoplankton, Organic material from decaying plants & animals

Gorgonians & Coral Polyps are eaten by: Banded Butterflyfish

HAWKSBILL SEA TURTLE

By Hoffryan at en.wikipedia [Public domain], from Wikimedia Commons

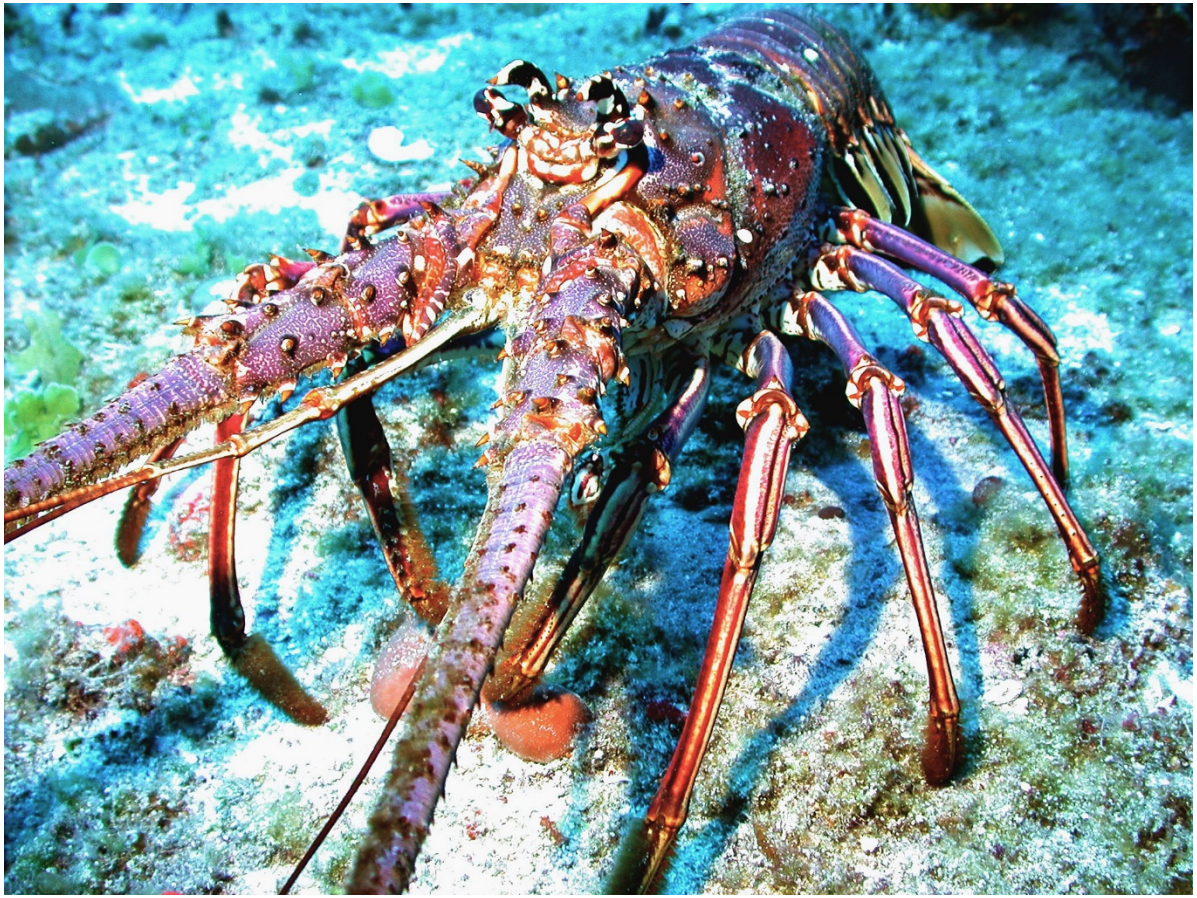
HAWKSBILL SEA TURTLE

- Secondary Consumers are Carnivores. They eat herbivores.
- These turtles can be found swimming over the reef or resting on the seafloor during the day searching for its favorite foods.
- The Hawksbill Sea Turtle was named for its hawk-like beak which they use to get food from crevices in coral reefs.
- These reptiles make nests in deep holes on the beach to lay their eggs. One nest can have up to 200 eggs!

Hawksbill Sea Turtles eat: Black Sea Urchins, Barrel Sponges, jellyfish, and squids, although they will eat just about anything. They are *omnivores*.

Hawksbill Sea Turtles are eaten by: Gray Reef Shark

CARIBBEAN SPINY LOBSTER



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SPINY LOBSTER

- Secondary Consumers are Carnivores. They eat herbivores.
- During the day, Spiny Lobsters hide in crevices in the reef.
- Spiny Lobsters are *crustaceans*. They have a hard shell-like skeleton that covers their body, tail and 6 legs.
- These lobsters don't have big claws! Instead they have two sharp spiny antennae at the top of their head which they use for fighting and defense against predators.

Caribbean Spiny Lobsters eat: Black Sea Urchins, snails, clams and crabs, although they will eat just about anything. They are *omnivores*.

Caribbean Spiny Lobsters are eaten by: Nassau Grouper, People

NASSAU GROUPER

Photo credit Paul Humann.

NASSAU GROUPER

- Tertiary Consumers are top-level Carnivores. They eat other carnivores.
- These fish can be found under structures on the reef or swimming over the seafloor during the day, but sometimes they're well camouflaged!
- Nassau groupers are *lie-in-wait ambushers*. These carnivores use extreme camouflage to avoid being seen by prey until the smaller fish are close enough to grab with their big mouths.
- Nassau groupers form *spawning aggregations* where males and females meet in big groups to reproduce (lay eggs). The microscopic eggs then float to the surface of the ocean until they are big enough to hatch.

Nassau Groupers eat: Princess Parrotfish, Blue Tang, Threespot Damselfish, Blue Chromis, French Angelfish, Caribbean Spiny Lobster, other groupers. They are *Apex Predators.*

Nassau Groupers are eaten by: Sharks, People, other groupers

GRAY REEF SHARK

GRAY REEF SHARK

- Tertiary Consumers are top-level Carnivores. They eat other carnivores.
- This shark hangs out in deep water during the day and then comes onto the reef at night to feed on fish.
- Gray Reef Sharks are very social, often seen in schools of more than 100 sharks together.
- The Gray Reef Shark has an excellent sense of smell. They can detect one part tuna extract in 10 billion parts of sea water!

Gray Reef Sharks eat: Princess Parrotfish, Blue Tang, Threespot Damselfish, Blue Chromis, French Angelfish, Yellowtail Snapper, Hawksbill Sea Turtle, Nassau Grouper, Great Barracuda, Banded Butterflyfish, Moray Eel, and other sharks. They are *Apex Predators*.

Gray Reef Sharks are eaten by: Other Sharks

GREAT BARRACUDA

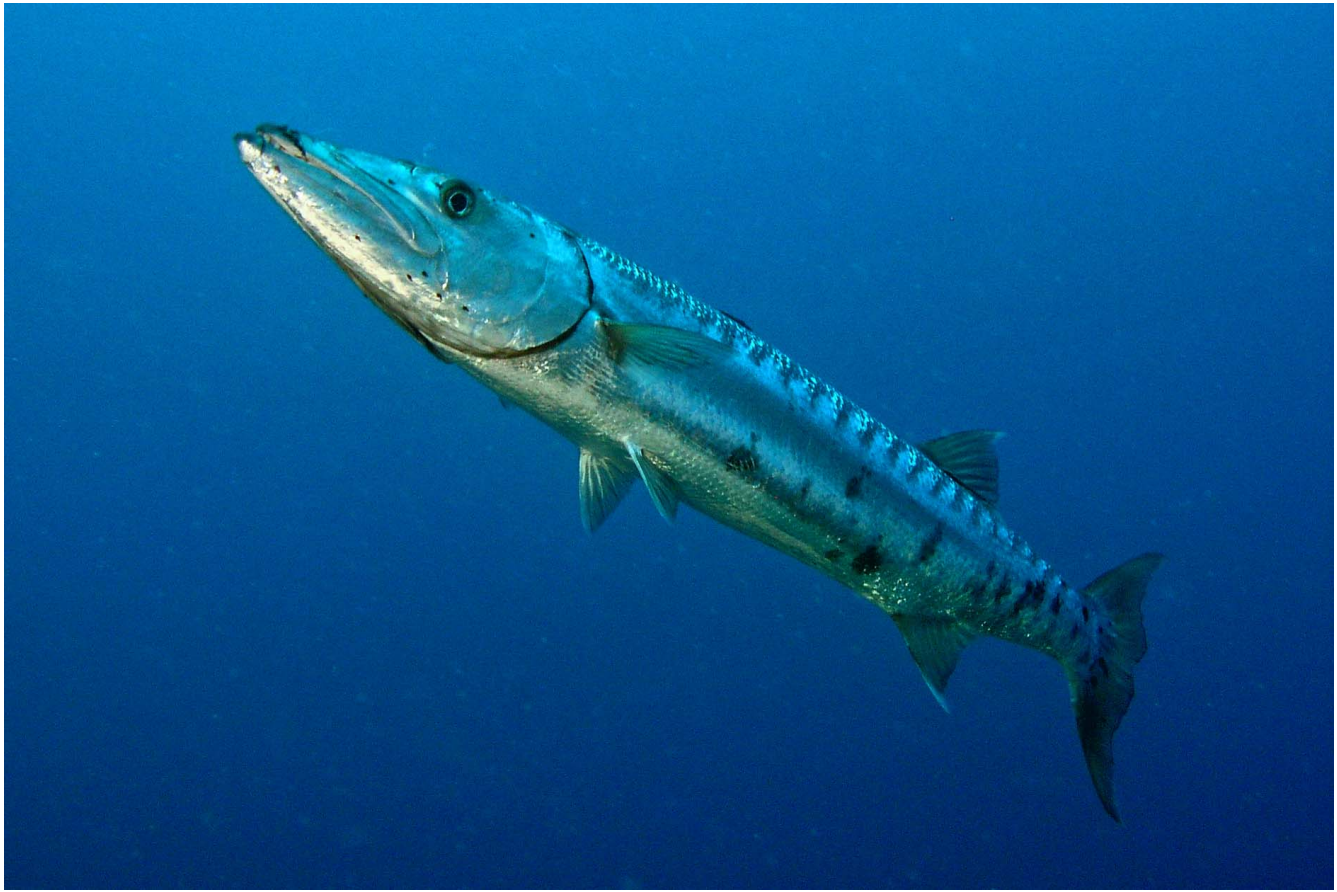

Photo credit Carol Cox.

GREAT BARRACUDA

- Tertiary Consumers are top-level Carnivores. They eat other carnivores.
- This *specialized carnivore* has an elongate, silvery body, strong jaws, and lots of sharp teeth to help stalk and capture prey.
- This *lie-in-wait stalker predator* hangs in the water and uses stealthy coloration and body shape to hide and surprise attack their prey.
- This fish hunts more by sight than by smell. They are often attracted to shiny objects that look like shiny, silver fish to them.

Great Barracuda eat: Princess Parrotfish, Blue Tang, Threespot Damselfish, Blue Chromis, French Angelfish, Yellowtail Snapper, Banded Butterflyfish

Great Barracuda are eaten by: Sharks, People

BANDED BUTTERFLYFISH

Photo credit Paul Humann.

BANDED BUTTERFLYFISH

- Tertiary Consumers are top-level Carnivores. They eat other carnivores.
- When you see one fish, look for another! Banded Butterflyfish mate for life and are often seen in pairs swimming over the reef.
- These *specialized carnivores* have long snouts and bristly teeth to actively hunt prey in small crevices and pick apart the tentacles of small coral polyps.
- Banded Butterflyfish are *daytime predators*. They swim around and hunt during the day, but sleep at night.

Banded Butterflyfish eat: Gorgonians and Coral Polyps, Zooplankton, algae

Banded Butterflyfish are eaten by: Nassau Grouper, Gray Reef Shark, Great Barracuda, Green Moray Eel

GREEN MORAY EEL

Photo credit Laszlo Ilyes.

GREEN MORAY EEL

- Tertiary Consumers are top-level Carnivores. They eat other carnivores.
- During the day, Green Moray Eels stay hidden in holes and crevices in the reef, but at night these *specialized carnivores* hunt by squeezing into small crevices.
- Sometimes, Green Morays will partner up with Groupers to hunt during the day. The Moray Eel scares prey out of crevices and the Grouper follows along.
- Green Morays aren't actually green! These eels have a blue body but are covered in a slimy yellow mucous giving them their green color. The mucous protects their bodies from scratches.

Green Moray Eels eat: Princess Parrotfish, Blue Tang, Threespot Damselfish, Blue Chromis, French Angelfish, Yellowtail Snapper, Banded Butterflyfish

Green Moray Eels are eaten by: Sharks