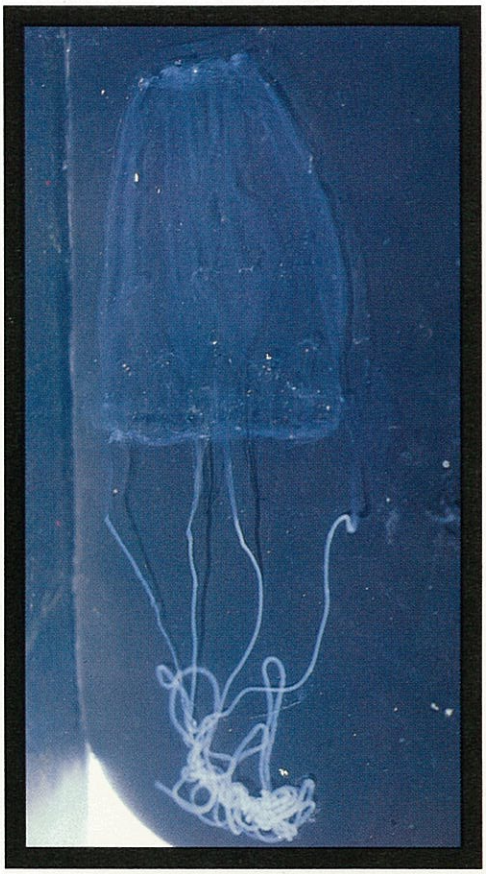
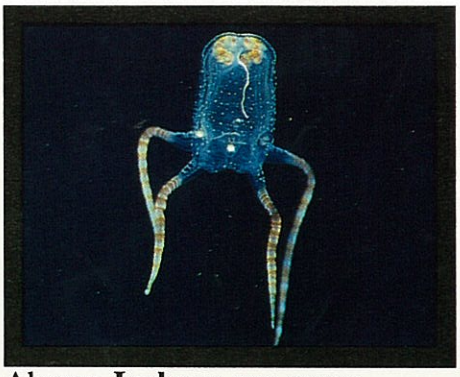


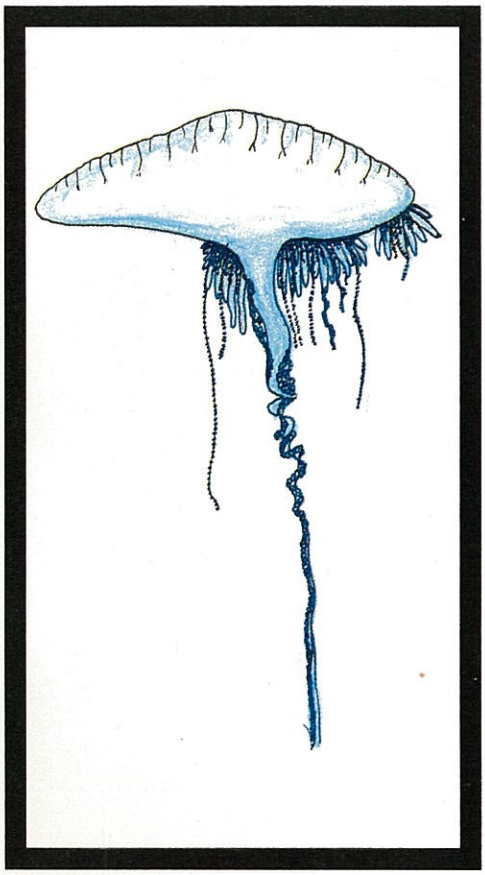


Above: **Inshore sea wasp**
Carybdea rastoni

Left: **Pelagic sea wasp**
Carybdea alalata

Right: **Indo-Pacific man-o-war**
Physalia utriculus

Photos © Robert F. Myers



ABUBON PAPAGO' (Jellyfishes)

Dangerous Marine Life

Jellyfishes are primitive life forms that lack any form of skeleton or hard body parts. They are members of the Phylum Coelenterata (Cnidaria) which also contains the corals and sea anemones. Coelenterates have specialized stinging cells called nematocysts which are venom-filled sacs that contain a tightly coiled hollow stinging thread. When stimulated, the stinging thread uncoils through a door at the opposite end of the cell. The venom is discharged through the everted thread and is used to immobilize small fishes and other creatures that are captured for food and for defense. Prey is either drawn up into a digestive cavity in the "bell" of the jellyfish, or into a dense mass of tentacles where it is digested.

There are many kinds of jellyfishes in Guam's waters. Most are not dangerous and cause only mild stinging or itching. Some are unable to affect humans because their stinging cells are not strong enough to penetrate the skin. But a few can cause severe stings that may require immediate medical attention, and could be potentially fatal, although there have not yet been any fatalities recorded on Guam. The most dangerous jellyfishes are the sea wasps and man-'o-war. The pelagic sea wasp occasionally occurs in large concentrations in Tumon Bay when onshore winds prevail. It is clear and nearly invisible. The smaller inshore sea wasp remains hidden in the reef during the day, but emerges into the water at night. It is common in the southern bays. The man-'o-war floats on the surface and trails several blue tentacles behind it. Large concentrations are occasionally blown inshore when winds change direction.

If someone is stung by a jellyfish, the pieces of tentacles that are stuck to the skin should be carefully removed immediately by the fingers (this is all right to do since the skin of your finger is probably too tough to be stung) or by pouring alcohol on them. Do not rub sand on the wound. If symptoms worsen, seek medical attention.

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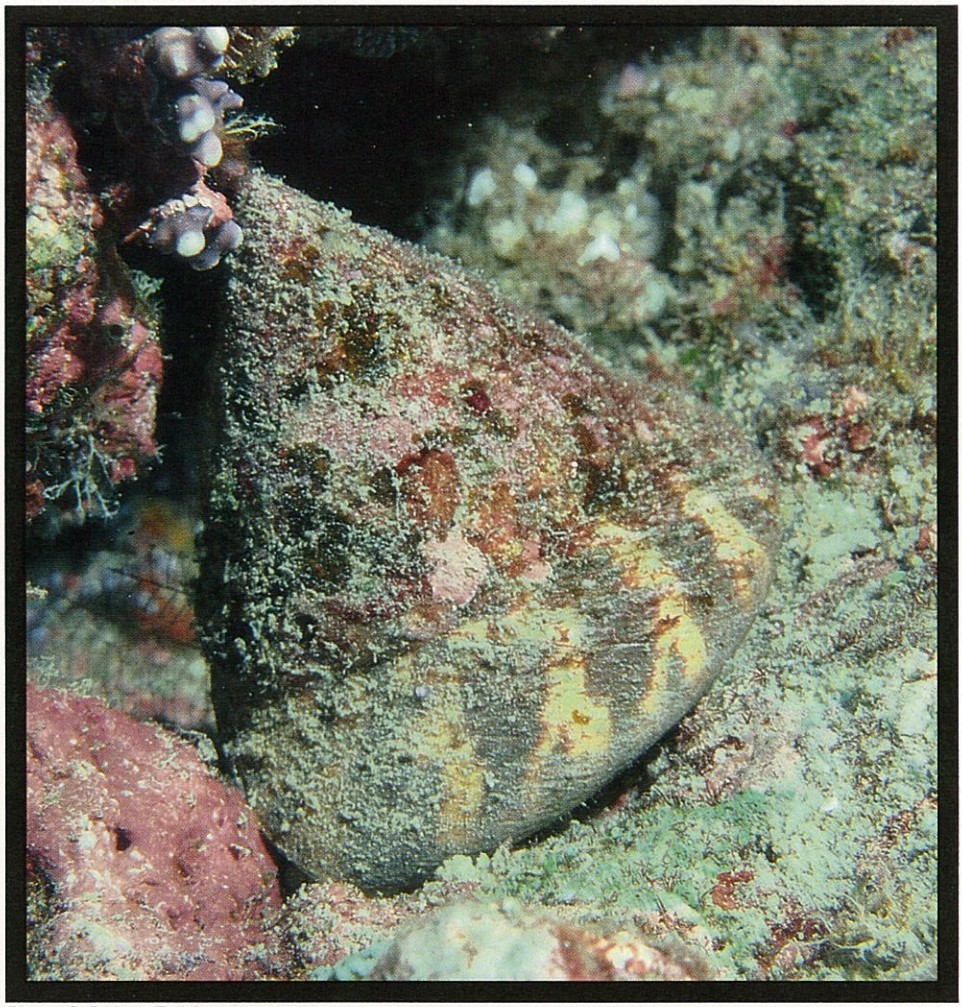

Photo © Robert F. Myers

ALILENG TULOMPO (Trochus)

Trochus niloticus

Introduced Species

Regulated Species

Trochus or top shell, is one of the larger shellfish that can be found on Guam's fringing reefs and reef flats. This popular delicacy can be found along reef flats at low tide.

Its Chamoru name, "alileng", has misled many residents into believing that the trochus is native to Guam. On the contrary, this rugged, spiralled, red and white shell is native to southwest Micronesia including Yap and Palau.

In the early 1950s a shipment of live alileng was brought to Guam from Saipan (where it was also introduced), in hopes of establishing the alileng as an important food source. It has now become widespread on our island and is common in most reef areas. Another kind of alileng, the "alileng pulan" or turban shell is native to Guam, but is not as common.

Typically, alileng live in areas where the water is clean and well circulated, often where there are big waves. They are found in overhangs, pits, or crevices which they often leave at night to feed. Alileng feed on filamentous algae which is the fuzzy growth on rocks and dead coral. Alileng are preyed upon by large crabs, octopuses, and certain large fishes including the tangison and rays. The large, white muscular foot of the alileng is a popular food for humans. The shell, when sanded down, makes a beautiful decorative piece or a mother of pearl button or jewelry.

Regulations allow year-round harvesting for home consumption provided the daily take is not over 50 pounds (22.7 kg) of shells (including the animal inside) per person per day. Of the 50 pounds, forty pounds (18.1 kg) must be three inches (7.6 cm) or larger at the base; the remaining ten pounds must measure two inches (5.1 cm) or greater. Under no circumstances may a harvester take alileng which measure below two inches.

The Division of Aquatic and Wildlife Resources urges everyone to exercise good judgment by taking only those alileng whose shells are three inches or larger. Commercial harvests have different and even stricter regulations and require a license from the Department of Agriculture. Commercial and non-commercial violators will be prosecuted to the fullest extent of the law.

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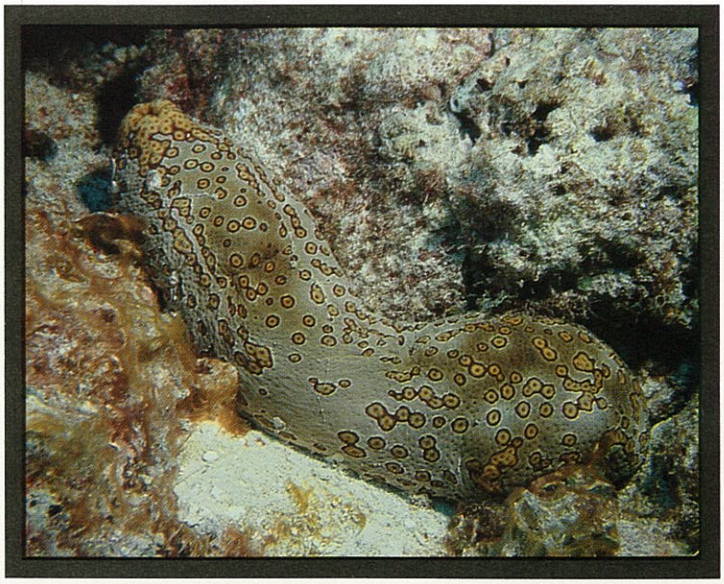
BALÅTE'
(Sea Cucumbers)



Spotted sea cucumber *Bohadschia argus*

Black sea cucumber *Holuthuria atra*

Synaptid sea cucumber *Sypnaptis maculata*

Balåte', as they are called in Chamoru, belong to a group of animals known as echinoderms which also includes sea urchins and starfishes. The word echinoderm means "spiny skin" and refers to the bony plates, spines, or spicules which either cover or are imbedded in the skin. Echinoderms also have a body plan based on radial symmetry in which many of the body parts are arranged symmetrically like spokes radiating from a common center. Echinoderms do not have a brain, eyes, or ears, but have a nerve network that enables them to function.

Balåte' are large elongate echinoderms that have small bony spicules embedded in the skin. There are at least 40 kinds of balåte' on Guam. Most have a rough leathery skin with tiny tubed feet on the underside.

Many kinds of balåte' have delicate branching tentacles surrounding the mouth. These are used to filter particulate matter and plankton from the water or to rub against the bottom and are thrust one at a time into the mouth where the food is wiped off. Other kinds have a simple hole for a mouth and ingest sand or debris from the bottom. The organic matter is digested and a trail of sand is expelled from the opposite end.

There are also many kinds of balåte' that can eject filaments of an extremely sticky and irritating substance when disturbed. Some even eject the entire digestive tract which can be regenerated. This is an effective defense against most predators. Members of the family Synaptidae have a thin delicate skin with tiny sharp spicules which can break off and irritate the skin. The large synaptid cucumber *(Synaptis maculata)* can stretch its body to a length of perhaps 6 feet (1.8 m) and is common in shallow weedy and sandy areas.

Many of the larger kinds of balåte' can be dried and eaten and are considered a delicacy by the Chinese.

Photos © Robert F. Myers

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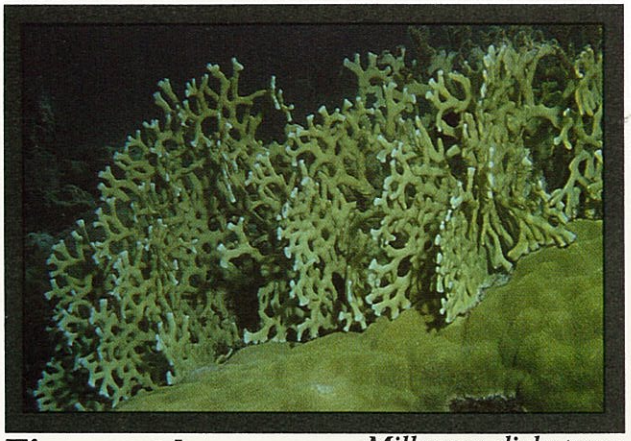
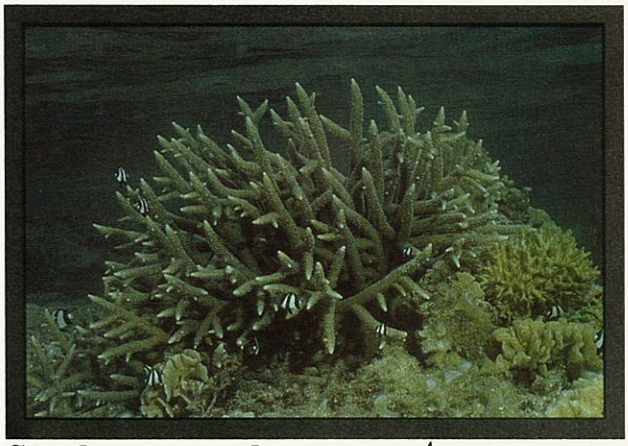
CHO'CHO' (Corals)



Fire coral *Millepora dichotoma*

A massive coral *Porites lutea*



Staghorn coral *Acropora aspera*

Soft coral *Sarcophyton tracheiliophorum*

Photos © Robert F. Myers except lowermost © Kathleen J. Dummitt

Corals, or cho'cho' in Chamoru, are members of a group of animals called Coelenterata which also includes jellyfishes and hydrozoans. Animals in this group have stinging cells called nematocysts. When a nematocyst is stimulated, a spiny springlike structure everts and injects a venom. Fire corals are hydrozoans that produce a hard stony skeleton. They are the only corals capable of inflicting a painful sting.

Cho'cho' consist of one or more animals called polyps. Each polyp is hollow and has a centrally-located mouth surrounded by tentacles. The tentacles contain batteries of nematocysts used for defense and feeding on plankton. Instead of having an internal skeleton for support like we have, a coral polyp builds an external skeleton around itself out of a substance called calcium carbonate which is basically the same thing as chalk, marble or limestone. Cho'cho' polyps slowly accumulate small amounts of the calcium carbonate that are dissolved in seawater.

There are several basic kinds of cho'cho'. The stony corals have polyps with multiples of six tentacles consisting of an outer layer of living polyps with an internal skeleton of calcium-carbonate attached at the base to a hard surface. There are nearly 300 kinds in Guam's waters. Octocorals include the soft corals and gorgonians, commonly called sea fans and have polyps with multiples of eight tentacles. There are several major groups of octocorals with dozens of local species. The leather corals are soft corals with a flexible leathery skeleton containing numerous embedded spicules; the gorgonians have a hard but flexible skeleton of black fibrous material.

Most stony corals and some octocorals require sunlight. Corals are animals, but the kinds that build reefs have living plants incorporated into their tissues. These plants, simple, single-celled algae called zooxanthellae, live in partnership with the corals. The zooxanthellae, like all plants, use the sun's energy to produce sugars by the process of photosynthesis. These sugars provide much of the coral's nutritional needs. In turn, the coral's waste products, primarily carbon dioxide and nitrogen compounds, are used by the zooxanthellae.

Guam has two types of coral reefs. The most common is the fringing reef which extends out from the shore as a shallow platform. The other is called a barrier reef which extends up from the sea bottom at some distance away from the island and is separated from shore by deep water. The reef outside of Apra Harbor near Cabras Island, and the reef surrounding Cocos Lagoon are barrier reefs. Coral reefs are very important to our island because they serve as habitat for the fish we eat and protect us from the pounding surf when a big storm hits. Siltation and pollution have destroyed many of our reefs and it will take hundreds of years before they can recover. It is **illegal** to take or destroy coral. Violators are subject to arrest, fines and/or imprisonment.

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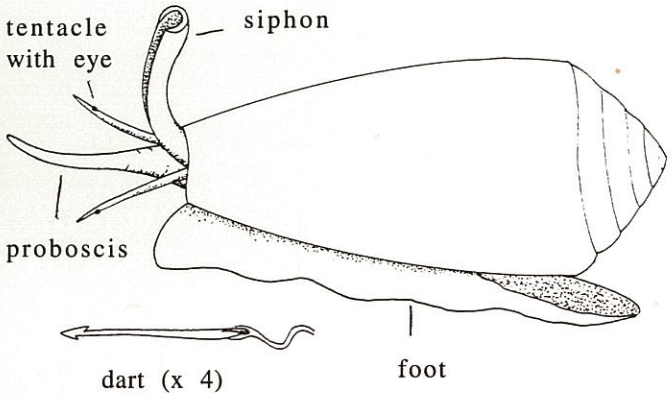
KARAKOT
(Cone Shells)

Venomous
Marine Animals

Geography cone *Conus geographus*

Striated cone *Conus striatus*



External anatomy of a coneshell. The venomous dart is located in the tip of the proboscus

Cone shells ("karakot" is the Chamoru term generally used for all shells found in the ocean, venomous or not) are distinctively shaped mollusks that have an efficient venom apparatus used to immobilize prey. This apparatus consists of a venom sack and duct that leads to a series of barbed darts. The darts are actually modified teeth located at the end of a long extensible organ called the proboscis. The proboscis is used to probe for prey as well as thrust the dart into the prey. Cone shells are gastropods, that is mollusks with a single spiral shell. Like most other gastropods they lay their eggs in segmented cases under rocks.

There are at least 70 kinds of cone shells on Guam. All are venomous, but only a few are considered dangerous. Most kinds of cone shells feed on worms and other small invertebrates. These generally have a weak venom that is not effective against humans. A few cone shells feed on small fishes and other mollusks. These have a potent venom and are capable of inflicting dangerous, even fatal wounds. Although the animal of the cone shell will generally withdraw into the shell when handled, the proboscis is extensible enough to reach any part of the shell so there is no completely safe way to handle one.

The most dangerous species of cone shells found on Guam are the geography cone (*Conus geographus*), striated cone (*Conus striatus*), textile cone (*Conus textile*), banda cone (*Conus bandanus*), and tulip cone (*Conus tulipa*).

Cone shells are an important component of the reef community as well as popular with shell collectors. Like all marine animals they should be treated with respect and not needlessly harmed or taken. If you collect shells, take only one or two of each kind that are in good condition and leave the rest to sustain the population.

Photos © Robert F. Myers

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GÅMSON
(Octopus)

Octopus cyanea

Photo © Robert F. Myers

Octopuses or gåmson as they are called in Chamoru, are mollusks, a large group which includes clams, snails, and most other animals popularly known as "shells." Gåmson, along with squids (called ngosngos in Chamoru), cuttlefishes, and nautiluses belong to the cephalopod class. Cephalopods are among the most intelligent of marine animals. They have well-developed eyes, a mouth with a hard beak surrounded by tentacles that are armed with numerous sucking discs, and a funnel connected to a hollow sac that can be used to propel the animal with a jet of water. All but the nautiluses are able to squirt a blob of ink that helps them to escape from predators. All of the local cephalopods are edible.

Gåmson have eight arms and a distinct sac-like head that contains all the animal's organs. There are at least five kinds of gåmson in local waters, but only one is commonly seen or caught. It reaches a large size, at least 43 pounds (19.5 kg) and over 7 feet (2.1 m) long from the tips of its tentacles to the end of its head. However, individuals over five pounds (2.3 kg) are rare. Two other smaller species, the white spotted octopus (*Octopus macropus*) and webfoot octopus (*Octopus membranaceus*) come out in the open primarily at night. At least two other very small species of gåmson have been photographed or collected in shallow reef waters. Gåmson feed mainly on crabs and shrimps that are paralyzed by a venom as they are bitten. The beak is then used to puncture holes in the shells and pick out the flesh. Gåmson also feed on various mollusks and fishes.

Ngosngos (squid) are closely related to gåmson but have 10 tentacles and an elongate body with fins at the opposite end. Two of the tentacles are retractible, longer than the rest, and have pads armed with hooks and suction cups at their tips. There are several local species, most with a body length of less than a foot. Most are found in the open sea but a few occur on shallow reefs. Cuttlefishes (also called ngosngos in Chamoru) resemble squids, but have a hard internal shell made of calcium and a fin that is continuous around the sides of the body. One species, the broadclub cuttlefish (*Sepia latimanus*) reaches a body length of 18 inches (46 cm). Ngosngos are just as good to eat as gåmson and are occasionally speared.

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1994

DAWR photo

HAGGAN (Green Sea Turtle) *Chelonia mydas*

Threatened Species (Federal); Endangered Species (Guam) **Native Resident**

The green sea turtle, or "haggan", is the most commonly sighted turtle in Guam's waters. They frequent the shallow reef areas around Guam while foraging for marine algae and seagrass. Fully grown adults can have a shell length of four feet (1.2 m) and can weigh over 300 pounds (136 kg). Sea turtles are long lived animals and grow reasonably slow averaging about 0.4 inches (1 cm) a year until mature and then 0.2 inches (0.5 cm). Using these growth rates, the larger adults are well over 50 years of age. The haggan is characterized by a shell colored with mottled shades of brown and a white to yellow underside. The shell plates are fused with no overlap, points or protrusions. The head has two plates between the eyes and each flipper has only one claw.

These turtles spend most of their lives in the ocean but once adults, will return every few years to the beach where they were born. Mating takes place a month or two prior to egg laying near the nest site and mating continues through the egg laying cycle. Females must be on the average, 23 years old to reach 32 inches (81 cm), the average size at first maturity. The female, once fertile, will crawl onto a sandy shoreline and use her flippers to dig a large pit above the high-water line near some vegetation. She will lay between 40-140 eggs depending on her size, and then cover them with sand. A female can lay as many as six clutches of eggs in one nesting season, which runs from April through July on Guam. The eggs take 50 to 90 days to hatch depending on conditions. The eggs will hatch near sunrise when two-inch (5 cm) long hatchlings emerge from their eggs, dig up through the sand, and start their journey to sea. Haggan still nest on some of Guam's more remote beaches throughout the island.

Turtle meat and turtle eggs were once prized food sources on Guam. The shells were used for decorative purposes. World-wide concern for overharvesting resulted in the haggan being listed on the Federal Threatened Species List and Guam Endangered Species List. It is illegal to capture, harass, possess, buy, sell, or transport the haggan or any part thereof including but not limited to eggs, shells, shell jewelry, and meat.

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1994

Common giant clam *Tridacna maxima*

Fluted giant clam *Tridacna squamosa*

Photos © Robert F. Myers

HIMA
(Giant Clams)

Regulated Species

Lagoon giant clam *Tridacna derasa*

Giant clams, known in Chamoru as "hima," have been important to the people of Guam for many years and are still considered a prized delicacy. Some eat the entire meat of the clam but usually the two large white abductor muscles are the choicest parts for eating.

Guam is known to have had at least four kinds of hima: *Tridacna maxima, Tridacna squamosa, Tridacna gigas*, and *Hippopus hippopus.* The latter two species are believed to be extinct on Guam, probably because they were overharvested. The remaining two are still found in our waters. The larger of the two, *T. squamosa* is rare, and the smaller one, *T. maxima,* lives tightly attached to rocks and coral on the ocean floor. They are most common in areas of strong water movement or in shallow waters beyond the reef. The lagoon giant clam, *Tridacna derasa,* which is plentiful in Palau, was intentionally introduced to Guam. Palau has been successful in raising these clams and selling them to other islands such as Guam to help establish them on their reefs.

Hima have a thick hard hinge on both halves of the shell which can be ground down to make tools. Traditionally, Chamorus collected hima from reef flats. After the meat was taken, the shells were made into tools. Hima use sunlight to grow. They contain plant cells called "zooxanthellae" which use the sun's energy to produce sugars which are used as food by the clam. Hima grow best in areas with clear water and plenty of sunlight. Even under the best conditions, it takes many years for them to reach a large size.

On Guam, hima can only be taken for home consumption from April through July. Commercial harvest is prohibited by law. They must not be smaller than 5.9 inches (15 cm) and no larger than 11.8 inches (30 cm). Only 20 pounds (9 kg) of shells can be taken per day during the season. There are areas on Guam where the harvesting of hima is prohibited. Harvesters should check with the Division of Aquatic & Wildlife Resources for more information on hima regulations and areas closed to harvesting.

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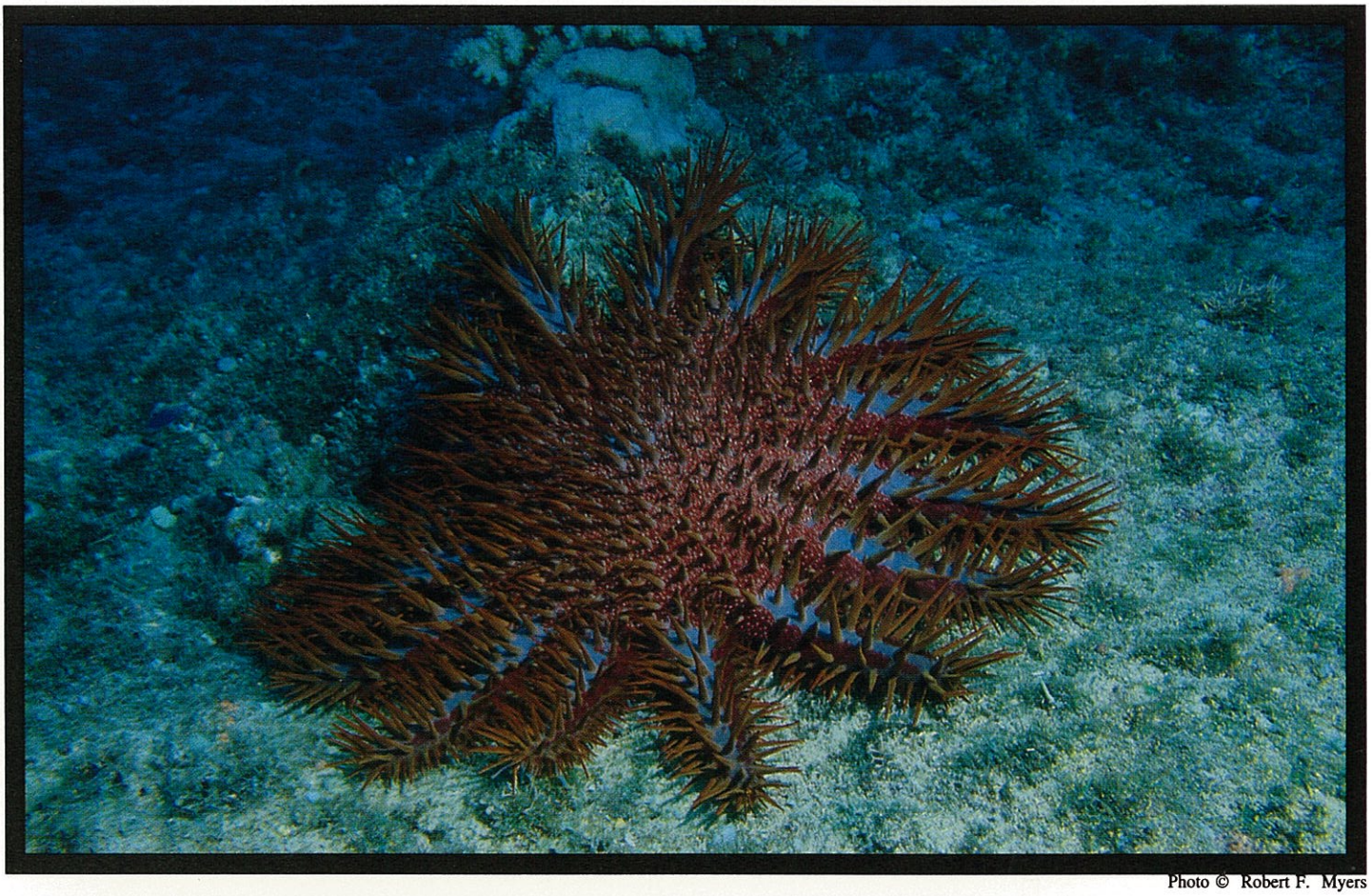

Photo © Robert F. Myers

CROWN-OF-THORNS STARFISH

Venomous Marine Organism

Acanthaster planci

The crown-of-thorns starfish is a large, many-armed invertebrate covered with long and sharp venomous spines. It is named after the crown-of-thorns placed on the head of Jesus during the Crucifixion. This infamous predator feeds exclusively on living corals by everting its stomach over the coral and digesting the soft tissue. It is normally uncommon, but periodically, large concentrations appear on certain reefs. When in such numbers they may form a moving front that advances along the reef, wiping out nearly all the living coral in their path. Evidence of recent predation by the crown-of-thorns starfish is easily seen in the form of numerous bleached coral skeletons. These bleached corals soon get covered with green filamentous algae and eventually crumble into rubble that may form the foundation for new coral colonies to settle and grow. Until the corals return, the variety of fishes and aesthetic value of the reef is greatly diminished, but populations of herbivorous fishes that feed on filamentous algae may actually increase. Needless to say, the crown-of-thorns starfish is considered an unwelcome pest.

The cause of crown-of-thorns infestations has been the subject of intensive research for many years. The weight of the evidence indicates human activity is the culprit. Although infestations occur naturally, they are rare events, occurring at an average of once every 400 years. But in areas where there are increased nutrient levels in the water as a result of agriculture or other land use practices that enhance soil erosion, infestations occur frequently and the reefs may never completely recover. It seems that the increased level of nutrients favors the development and survival of the planktonic larvae or juvenile starfish when they settle on the reef.

There are very few natural predators of the crown-of-thorns starfish. These include large humphead wrasse (tangison) and two rare invertebrates, the triton trumpet (a large shell) called kulo' in Chamoru, and the tiny colorful harlequin shrimp.

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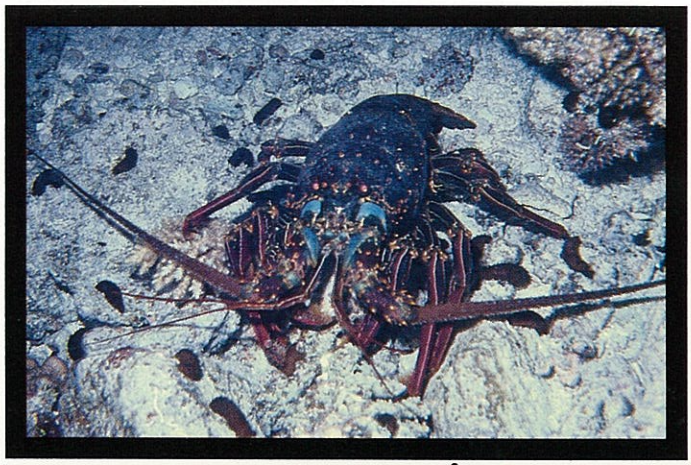
REEF CRUSTACEANS

There are several hundreds of kinds of crustaceans on Guam's coral reefs. Most are small and remain well-hidden. Most of the local crustaceans feed on almost any plant or animal matter they can find. For many species this is primarily algae with associated tiny animals. Crabs use their pincers for grasping food while mahonggang (spiny lobsters) and papangpang (slipper lobsters) use their sharply-pointed hairy front legs to snag their food.

All crustaceans have an external skeleton (exoskeleton) which must be periodically shed in order for them to grow. This is known as moulting or in Chamoru, manggosni. After each moult, their new shells are soft for several hours or days until enough calcium is absorbed to make them hard. They then grow within their shells until there is no longer enough room and they must moult again.

Lobsters are the largest and most valuable of the reef's crustaceans. The most common spiny lobster is the mahonggang (*Panulirus penicillatus*) or gupo'ålao as Chamorus call it when it reaches a giant size. It lives primarily along the wave-swept reef margin. Other species tend to occur in deeper water, but are not commonly seen. The papangpang has a wide flattened carapace that covers its legs. There are hundreds of species of crabs on Guam's reefs, but only two, the pånglao oru (seven-eleven crab) and the pånglao guaka (red reef crab) are large enough to be commonly taken.

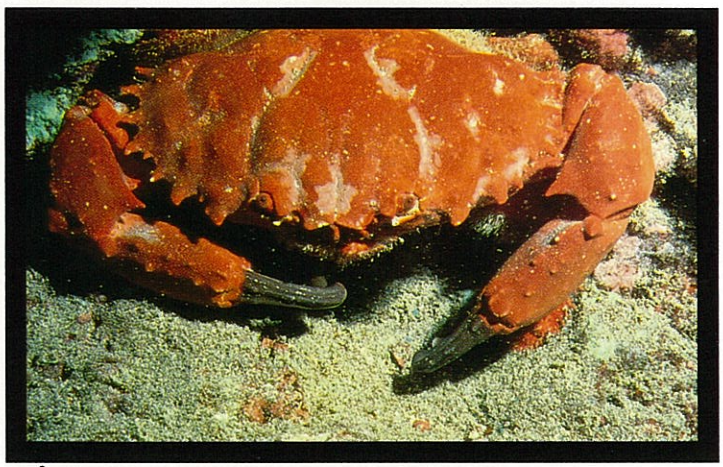
Mahonggang are Guam's only regulated crustaceans. They must weigh at least one pound and females with eggs may not be taken during the months of May, June, and July. Forthcoming regulations will change the weight limit to a corresponding size (carapace length) limit which is easier to measure underwater. It would also prohibit the spearing of mahonggang so that undersized ones may be released unharmed.



MAHONGGANG/GUPO'ÅLAO
(Spiny lobster) *Panulirus penicillatus*
Regulated species

PAPANGPANG (Slipper lobster)
Parribaccus antarcticus

PÅNGLAO ORU (Seven-eleven crab)
Carpilius maculatus



PÅNGLAO GUAKA (Red reef crab)
Etisus splendidus

Photos © Robert F. Myers

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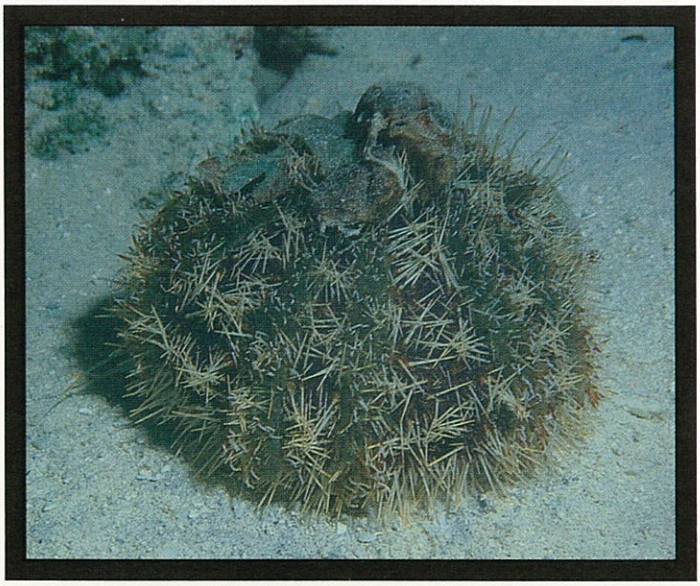
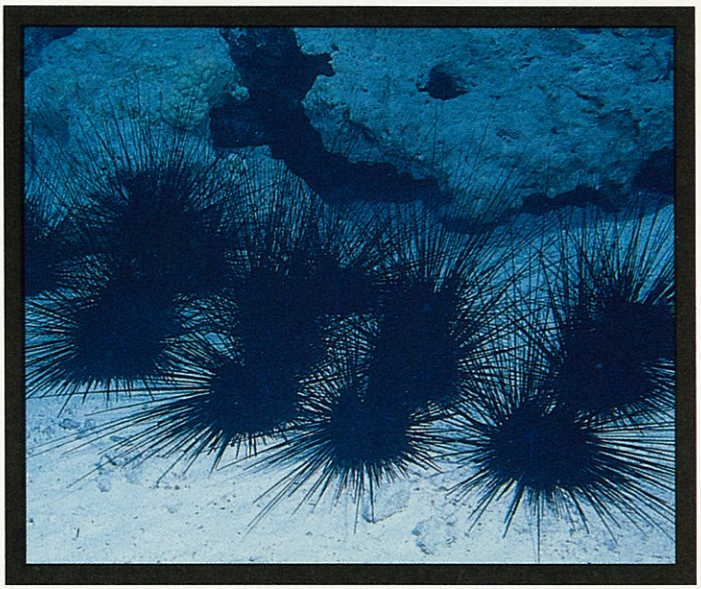
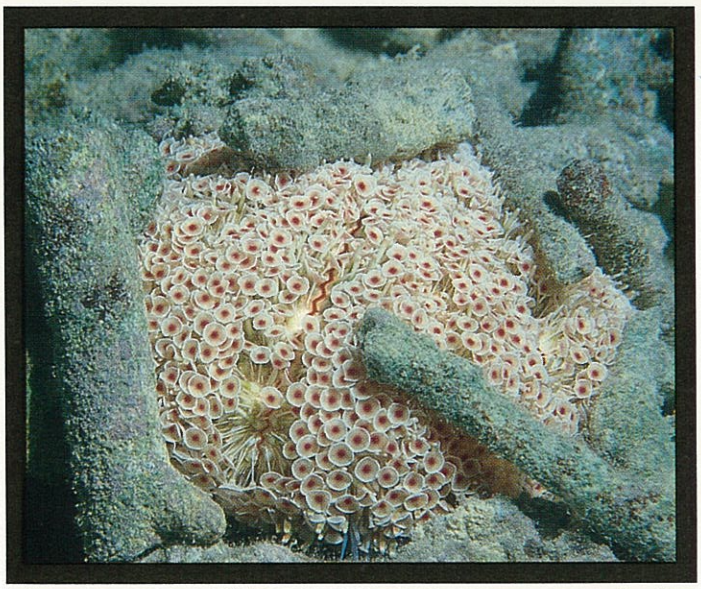


Shortspine urchin *Tripneustes gratilla*



Longspine urchin *Diadema savignyi*



Flowery urchin *Toxopneustes pileolus*

Photos © Robert F. Myers

DANGEROUS MARINE LIFE

LÅ'ON
(Sea Urchins)

Sea urchins, called lå'on in Chamoru, belong to a group of animals known as echinoderms which also includes starfishes and sea cucumbers. The word echinoderm means "spiny skin" and refers to the bony plates, spines, or spicules which either cover or are imbedded in the skin.

Echinoderms also have a body plan based on radial symmetry in which many of the body parts are arranged symmetrically like spokes radiating from a common center. Echinoderms do not have a brain, eyes, or ears, but have a nerve network that enables them to function.

Lå'on have an outer shell called a test which consists of interlocking plates. Each plate has rows of sockets that hold either spines or pinching appendages called pedicellariae. A thin outer skin covers the test. A mouth with teeth is located in the center of the underside of the test.

Lå'on feed by rasping algae from the bottom. Waste products are passed through a small hole on the top of the test. Digestive and reproductive organs are located inside the test. The cream-colored eggs of many lå'on are a delicacy and lå'on are harvested for food in many places.

There at least 28 kinds of lå'on on Guam. Most have sharp brittle spines that can break off on contact and cause painful wounds. The spines of some kinds are slightly venomous. Most lå'on wounds are not serious; usually the pain subsides in a few hours and particles of spine dissolve in a day or two. Soaking the wound in hot water may speed the healing process.

Many lå'on have venomous flower-like pedicellariae. The flowery urchin is covered with colorful pink pedicellariae which can cause extremely painful wounds that may last several days. This urchin is not always noticed because it covers itself with bits of debris. All sea urchins have soft tubed feet with suction cups at the end. These are used to cling to the bottom, transport food particles, and hold debris for camouflage.

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larvae

chrysalis

adult

Photos © Robert Myers (left) and Chris wille (above)

ABABANG
(Blue-banded King Crow Butterfly)

Euploea leucostictos

There are many different insects on Guam. Some, like flies (lålo'), cockroaches (kukurâcha), and mosquitoes (namu), are unpopular pests. Others, like mantises and wasps are helpful because they eat pests. Butterflies are welcomed visitors to yards and gardens because they are beautiful. Some butterflies may also be helpful by pollinating plants, but others may be pests because their caterpillars eat useful plants.

There are several different kinds of butterflies on Guam, all of which are collectively known in Chamoru as "ababang." Some live deep in the forest. Others like open fields and grass areas. Butterflies eat the sweet liquid produced by flowers called nectar. Their mouth parts form a long tube that is used to suck the nectar from flowers. By moving from one flower to another, they spread the plant's pollen. This helps plants reproduce. Butterflies have two pairs of wings and six legs. Their wings are covered with colorful tiny scales that can come off when touched.

Ababang have an amazing life history. Females of the flying adults lay tiny eggs. The eggs hatch into a larval stage called the caterpillar. Caterpillars have a worm-like body with many legs and are often colorful and decorated with hairs, spines, or tassels. They feed entirely on leaves. The caterpillar turns into a hard, little, cocoon-like object called a chrysalis. The chrysalis hangs from a plant for several days or weeks. Finally, it breaks open and a beautiful adult butterfly comes out. This fantastic process of changing from one form to another is called metamorphosis. All ababang and moths (babali) go through metamorphosis. Metamorphosis can be watched by capturing a caterpillar and feeding it leafy branches of the plant it is found on until it makes a chrysalis and the adult ababang emerges.

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ACHI'AK
(Skinks and Anole)

Curious skink *Carlia fusca*

Tide pool skink *Emoia atrocostata*

Blue-tailed skink *Emoia caeruleocauda*

Carolina anole *Anolis carolinensis*

Photos © Gordon H. Rodda, Gary J. Wiles and Robert F. Myers

It would be difficult to walk anywhere on Guam without seeing an "achi'ak". These quick little lizards are everywhere. Like snakes, these lizards have scales that are arranged in neat rows. They are also cold-blooded. This means that their body temperature is the same as the temperature of their surroundings. They are often seen laying in the sun on rocks and logs.

Skinks and anoles rely on their speed to catch insects or escape predators. If caught by the tail, some lizards can run away leaving the tail behind which can be regrown. Birds (especially chickens), brown tree snakes, and rats feed on lizards.

There are seven different species of skinks and one species of anole on Guam, all called "achi'ak" in Chamoru. The most common kinds, the curious skink and the anole, were accidentally brought to the island by humans within the last 50 years. The curious skink is uniformly brown. The anole is able to change its color from green to brown. Male anoles have a colorful pink flap of skin under the chin called a dewlap. This is displayed when courting females or defending their territory from other males.

Most of the native species of skinks are more colorful than the curious skink. Unfortunately, they have either been displaced by the curious skink or have fallen prey to introduced predators, such as the brown tree snake, and are now uncommon or extinct on Guam. Most of these are still present on Cocos Island, the only remaining refuge from predators or introduced species. The blue-tailed skink is one native that is still holding out on Guam. The young and females of this species have blue tales but adult males are entirely brown.

Some skinks like the curious skink, live on the ground, but others like the anole live on trees.

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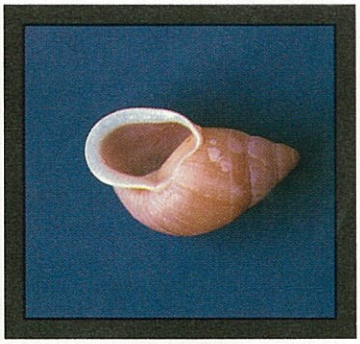
Partula gibba

Partula radiolata



Partula salifana
(Extinct)

Samoana fragilis

NATIVE TREE SNAILS

AKALEHA′ (Tree and Land Snails)

There are 66 species of native terrestrial snails on Guam. Snails that live on vegetation are referred to as tree snails, while those that burrow under decaying leaves and soil are called land snails. All are known as "akaleha' " in Chamoru. All evolved in isolation from many of the predators and parasites found in continental areas. The tree snails had so few enemies that they no longer needed to reproduce prolifically and evolved to have only a few young at a time and to take one to several years to reach maturity. On Guam, all of them are now rare, endangered, or extinct.

Several factors work in combination to threaten the tree snails, including habitat loss to agriculture and development, pesticides, wildland fires, competition from introduced species, and predation by a large introduced flatworm (*Platydemus manokwari*).

Giant African snail *Achatina fulica*
Introduced Species

Flatworm *Platydemus manokwari*
Introduced Species

Photos © Barry Smith, Gary Wiles, and Chris Wille

At least one species of tree snail, the endemic *Partula salifana*, and two species of land snails are now extinct on Guam. All of Saipan's tree snails and two of Rota's three species are also extinct.

A number of introduced snails also occur on Guam, the most well known being the giant African snail. Also known locally as "akaleha' ", they came to Guam during World War II, perhaps by hiding aboard a cargo ship. Some biologists think they were deliberately brought here for people to eat.

The giant African snail is still found at many locations around the island. However, it is much less common today than in the 1960s and 1970s, when it became an agricultural pest. Its numbers are probably controlled by the flatworm. This snail grows quickly and can reach full size in two years. Some snails over seven inches long have been found, but most are about three inches. The adults lay hundreds of eggs in loose soil and under leaves.

The flatworm, known as "tagulan tåno'" in Chamoru, is a voracious snail predator. It is 1-3 inches (2.5-7.5 cm) long and is nocturnal. During the day, it hides in leaf litter, and under logs and rocks. Its impact on native snails is similar to that of the brown tree snake on Guam's bird populations. The intentional introduction of the flatworm to other Pacific islands should be discouraged.

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Photo © Robert F. Myers

AYUYU (Coconut Crab)

Native Species *Birgus latro* **Regulated Species**

Coconut crab or ayuyu as it is called in Chamoru, is a very popular dish at fiestas and family parties because of its delicious taste. It can grow quite large, with a legspan of up to three feet (90 cm). However, most are captured by crab hunters before they get anywhere close to this size.

Ayuyu are basically giant hermit crabs that begin their life in the sea. Adult females lay their eggs in the sea. The eggs hatch into tiny larvae that drift with the currents for a few months before settling to the bottom where they transform into tiny crabs. They then climb into a seashell and crawl up on the beach. At this time, they look very much like hermit crabs. Soon they leave their seashell and depend on their own hard shell for protection.

The ayuyu digs holes in which they hide during the day. At night they come out to look for food. They will eat almost anything including fruits, plants and rotten wood. Their favorite food, of course, is coconut. Using their strong claws, they tear away the tough coconut husk and then, somehow, crack the nut inside. If you are not familiar with coconut crabs, do not try to capture one. They have incredibly strong claws that can grip and tear any object within reach.

Full grown ayuyu have no natural enemies other than humans. Young ayuyu may be eaten by some of the predators that people have brought to the island, such as rats, wild pigs, dogs, and monitor lizards. Ayuyu grow very slowly and are easily overharvested. On Guam, giant ayuyu are rare and even small ones have become hard to find. In some places, they can no longer be found. The ayuyu may be hunted year-round, however, its shell (or carapace) must measure three (7.5 cm) or more inches across. Taking undersized crabs is illegal and carries a penalty of up to $500 or 90 days in jail, or both.

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DAWR Photo

BABUEN HÅLOMTÅNO'
(Wild Pig) *Sus scrofa*

Regulated Game Species

Domestic pigs were brought to Guam by the Spanish in the late 1600s. The first stock probably came from domestic herds in the Philippines and was likely introduced to feed the soldiers, government servants, and missionaries present on Guam. Some of this domestic stock eventually escaped from captivity or were intentionally released and established wild, free living populations in the forest, completely away from people. These were the ancestors of our wild pigs now found in the boonies.

Known in Chamoru as babuen hålomtåno', wild pigs are smaller than domestic pigs. Wild adult males or boars typically weigh from 50 to 120 pounds but can weigh up to 300 pounds. Wild pigs are usually all black, with stiff bristle-like hair. Some are spotted with white and red. These mixed colors come from breeding with farmers' pigs. Both males and females have sharp canine teeth called tusks (or "kotniyos" in Chamoru) that are used for fighting and feeding. These grow to long lengths in males and are highly prized as trophies by hunters.

The wild pig can raise one litter of babies every eight months. They give birth to between one and 10 piglets, usually five. The piglets nurse from the sow or mother pig for about four months until they become big enough to find their own food. Pigs can eat almost anything. They dig around in the forest floor with their nose searching for fallen fruits, young plants, coconuts and animals like worms and snails. They feed on farmers' crops such as watermelon and taro, causing considerable damage. They also build and use wallows. Wallows are pits that trap water when it rains. Rooting, wallowing, and trampling by pigs can cause severe damage to forest and agricultural resources. Such damage is visible in many of Guam's forests today.

Pig numbers have increased in recent years. They are common to abundant in northern limestone forests and less common in savanna habitat in central and southern areas.

Hunting of wild pigs provides a significant amount of recreation for island sportsmen. Wild pig season is year-round on Guam and the legal bag limit is two per day and 40 per season. Pigs may be hunted only with a hunting license and during legal hunting hours which is a half hour before sunrise to a half hour after sunset.

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CHÅ'KA
(Rats/Shrews)

HOUSE MOUSE *Mus musculus*

ROOF RAT *Rattus rattus*

CHA'KAN AKALEHA'
(Musk Shrew) *Suncus murunis*

Rats have been introduced to many Pacific islands. Guam has three species, the Polynesian rat (*Rattus exulans*), the roof rat (*Rattus rattus*), and the Norway rat (*Rattus norvegicus*). The Polynesian rat(*Rattus exulans*) is the smallest kind and probably reached the island with early Chamoru settlers. It is not very abundant now. The roof rat is the most common species today and likely arrived aboard Spanish ships. This rat occurs in nearly all kinds of natural and human-made habitats. The Norway rat is the largest of the three species and usually lives in urban areas. It was first discovered here in 1962.

The house mouse (*Mus musculus*) is another rodent that became established on Guam during the last several hundred years. The musk shrew (*Suncus murinus*) is small and gray, but is not a rodent. It feeds on insects and other small animals, and was accidentally introduced in the 1950s. The mouse and shrew both live in natural and urban areas.

All five of these animals are collectively known in Chamoru as "chå'ka". All are considered pests because they often live in buildings and can damage stored goods and food. But equally important, they have caused serious ecological problems on many Pacific islands by preying on native forest birds, seabirds, lizards, and other kinds of native wildlife.

Rats are good at raiding bird nests and eating eggs and young birds.

Photos by Gary J. Wiles

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FANIHI

(Mariana Fruit Bat)

Pteropus mariannus

Endangered Species

Endemic to the Mariana Islands

Photo by Dr. Merlin Tuttle
Bat Conservation International

The Mariana fruit bat or fanihi as it is called in Chamoru, is one of Guam's endangered mammals. It lives only on Guam and the other Mariana Islands. At one time, huge flocks of fanihi filled the evening sky. Counts made by the Division of Aquatic and Wildlife Resources show that numbers of fanihi left on Guam vary from about 200-600 bats annually, depending on how many fly back and forth to Rota.

Fanihi roost in trees during the day. They live together in groups or colonies. They have good eyesight and smell, and are most active at night. These graceful flyers eat the fruit of pandanus, breadfruit, wild figs, fagot, and cycads, and the flowers of kapok, coconut, and gaogao, plus many other fruits and blossoms. The fanihi has only one baby a year. The young fanihi clings to its mother and nurses milk from her until it is old enough to find food on its own.

Fanihi live deep in the forest where they will not be disturbed by people. At present, the most serious threat to fanihi on Guam is predation on young bats by the brown tree snake. Another problem is that fanihi are still hunted because many older Chamorus like to eat them.

Over the years, many fanihi have been shot and eaten by people who do not care whether we have any fanihi left for future generations to see and appreciate. Because nearly all of our forest birds are gone, the fanihi is one of the few pollinators and seed dispersers left in the forest. Without the fanihi, many types of forest trees could disappear because there will be no animals left to spread their seeds and pollinate their flowers.

To protect the remaining population, the fanihi has been declared an endangered species, which means they are protected by both local and federal laws. The public is reminded that it is illegal to hunt, kill, capture, or in any way harm the fanihi. Violators are subject to a penalty of up to $5,000 or one year in prison, or both.

A second smaller kind of fanihi, the little Mariana fruit bat (*Pteropus tokudae*) was found on our island, however, it became extinct about 1970.

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GUÅLI'EK
(Geckos)

House gecko *Hemidactylus frenatus*

Mourning gecko *Lepidodactylus lugubris*

Oceanic gecko *Gehyra oceanica*

Photos © Robert F. Myers

Geckos, or "guåli'ek", as most are called locally, are some of the best known animals on Guam. Six species of geckos occur on our island. Several of these, including the oceanic gecko, Micronesian gecko, and Pacific slender-toed gecko, have recently disappeared or become rare, probably because of predation by kulepbla (brown tree snakes) or cha'ka (musk shrews).

Two types of guåli'ek, the house gecko and the mourning gecko, are well adapted to living with people. Both are numerous in buildings and are the species people see most often on walls and ceilings of their homes. Their favorite foods are flying insects which are attracted to lights.

Most reptiles are silent, but guåli'ek make a loud chirping sound. They call at all times of the day and night, probably to warn off other guåli'ek entering their territories. Another unusual feature of the guåli'ek is their specially-shaped toes, which help them run on smooth vertical surfaces such as walls and trees.

Guåli'ek usually lay two small round eggs that hatch in about a month. The baby guåli'ek have to immediately begin finding their own food and avoid predators, such as cats and larger guåli'ek. If a guåli'ek is caught by its tail, it simply loses it and escapes. In time, it will grow a new tail.

Guåli'ek are harmless and many people consider it a sign of good luck to have them in their house.

Mutilated gecko *Gehyra mutilata*

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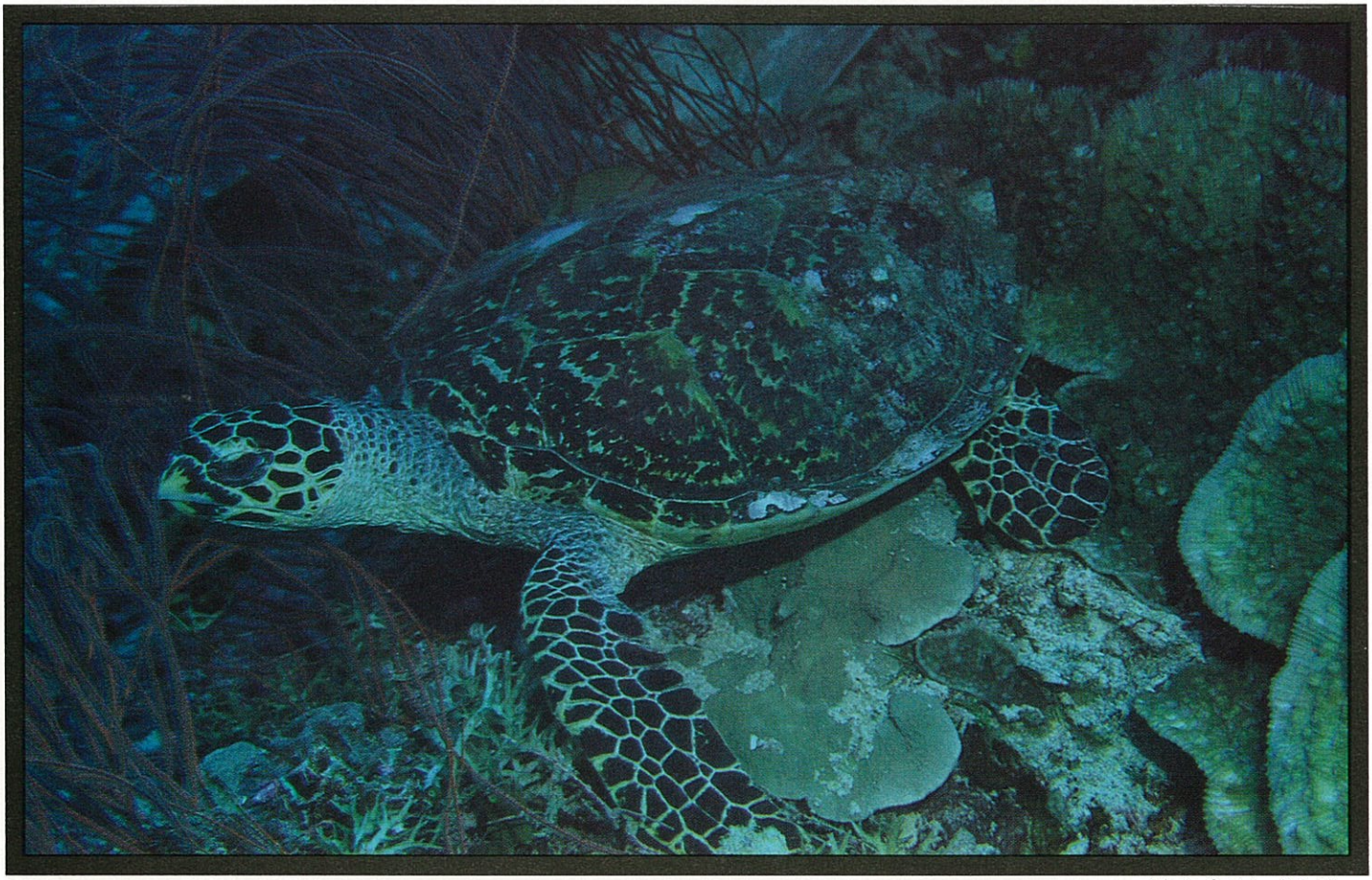

Photo © Robert F. Myers

HAGGAN KARAI

(Hawksbill Sea Turtle) *Eretmochelys imbricata*

Endangered Species **Native Resident**

The hawksbill sea turtle, or "haggan karai" as it is known in Chamoru, is less common around Guam than the green sea turtle (haggan) but is not considered rare. Considerably smaller than the haggan, a fully grown haggan karai reaches a weight of only about 100 pounds (45 kg) with a maximum shell length of 2.5 feet (76 cm). The haggan karai feeds primarily on sponges and therefore is most frequently observed in harbors and lagoons where sponges are abundant.

The upper surface of the haggan karai is mottled brown and the underside is straw yellow. The shell plates and edges overlap forming a semi-jagged edge toward the back end of the shell. There are four plates between the eyes and two claws on each flipper.

Haggan karai spend most of their lives in the ocean, but every few years will migrate back to the beach where they were born. The female crawls ashore on a sandy beach and uses her flippers to dig a large hole in the sand above the high-water line near some vegetation. She lays about 100 eggs which she covers with sand. The eggs take about 60 days to hatch. Near sunrise, the two-inch (5 cm) long hatchlings emerge from their eggs, dig up through the sand, and start their journey out to sea. Haggan karai still occasionally nest on Guam.

Turtle meat and turtle eggs were once prized food sources on Guam and the shells were used for decorative purposes. The haggan karai has been placed on the Federal and local Endangered Species lists. It is illegal to capture, possess, buy, sell, or transport the haggan karai or any part thereof, including but not limited to shells, shell jewelry, and meat.

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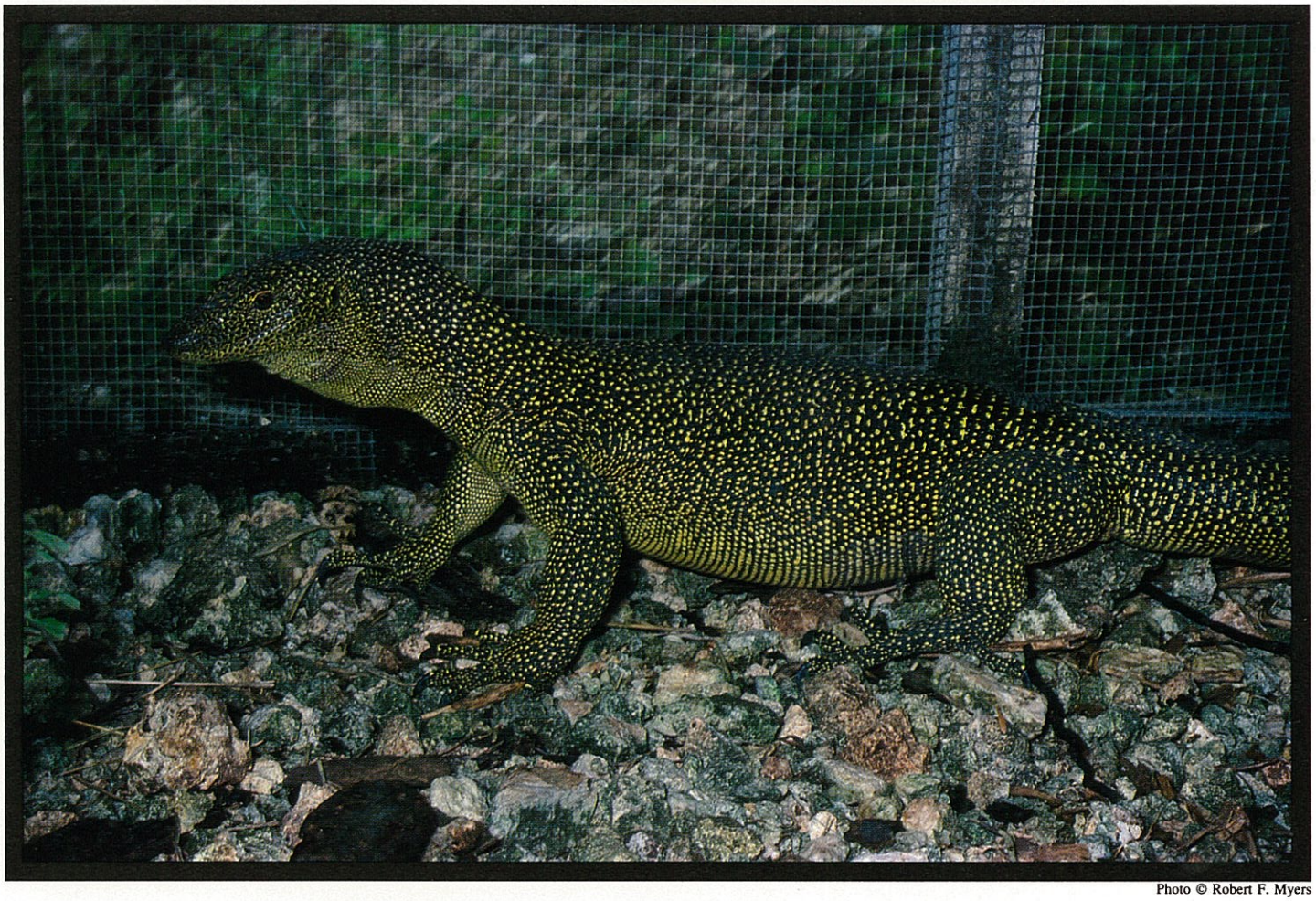

Photo © Robert F. Myers

HILITAI (Monitor Lizard)

Varanus indicus

Introduced Species

This handsomely-spotted lizard is often mistakenly called an iguana, however, Micronesia has no true iguanas. The monitor lizard, or "hilitai" as it is called in Chamoru, has a pattern of yellow or white spots on a dark green background which blends in perfectly with jungle leaves.

Like kulepbla (brown tree snakes), hilitai have scales that are arranged in neat rows and overlap like shingles or fit closely together like tiles. They are also cold-blooded. This means that their body temperature is the same as the temperature of their surroundings. They are often seen laying in the sun on rocks and logs in order to stay warm.

No one knows how the hilitai got to Guam but it is certain that they have been in Micronesia for a long time. They are very well adapted to island living and can run with considerable speed, climb trees, dig holes and swim.

A three-foot (90 cm) long hilitai is about average size. Deep in the jungle they may grow to four or five feet (1.2-1.5 m). These reptiles will eat almost anything that they can catch including insects, snails, smaller lizards, rats, crabs, birds, bird eggs and dead animals. They can even catch fish in the water.

The hilitai digs a hole under a rock or tree for a nesting den. In this hole, the female will lay between eight to 12 eggs, each about the size of a chicken's egg, but with a soft, leather-like shell.

They are found everywhere on Guam although their numbers may have decreased due to hunting and predation of young by snakes.

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SANYE'YE' or PAYU'AK (Spiders)

SANYE'YE' (Tent spider)
Cyrtophora mollucensis

SANYE'YE' (Garden spider)
Argiope sp.

PAYU'AK (Huntsman spider)
Heteropoda venatoria

Many people think spiders are insects, but they are arachnids. Instead of an insect's three main body parts and three pairs of legs, spiders have two main body parts, the head-thorax and the abdomen, and eight legs. Arachnids have large hollow fangs with venom glands. The venom mixed with digestive juices is injected into the bodies of their prey. This kills the prey and turns their insides into a liquid that can be sucked out. Although none of Guam's spiders has a dangerous bite, the bite of some can cause a painful, itchy welt that takes several days to heal. Female spiders have silk glands at the end of their abdomen. The silk is used to build webs, wrap prey, and make egg cases.

There are about thirty kinds of spiders on Guam. Many are believed to have been introduced to our island by people. Spiders that build webs are called "sanye'ye'" in Chamoru, while those that do not are called "payu'ak." Web builders live on their webs and wait for insects and other small animals to be trapped. The beautiful garden spider is a welcomed resident of gardens because it traps crop-damaging insects in its web. Females of some web-builders try to eat the male after they have mated. The huntsman spider, which does not build a web, has a hairy body and is common in ranch houses. It hunts insects at night. Females carry the eggs in a silk case beneath the abdomen. Crab spiders are another group that resemble flowers in order to ambush their prey. All spiders on Guam are beneficial to humans because of their ability to trap insects that may be harmful to crops or people.

PAYU'AK (Crab spider) *Thomsonia* sp.

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Photos © Robert F. Myers

Marine toad (*Bufo marinus*); inset: **Dwarf tree frog** (*Littoria fallax*)

Photos © Robert F. Myers

TOT (Toads and Frogs)

Introduced Species

Frogs and toads are amphibians, which means that they live part of their lives in water and part on land. Toads usually have dry bumpy skin while frogs have smooth, moist skin. Toads and frogs lay their eggs in fresh water. Any puddle or pond will do. An amazing thing happens with their jelly-like eggs. They hatch into animals known as tadpoles or polliwogs that look more like fish than toads or frogs. The little tadpoles quickly grow legs, lose their tails, and start breathing air. Guam has one kind of toad, the marine toad, and one kind of frog, the eastern dwarf tree frog.

The tot as it is called in Chamoru, was brought to Guam in 1937 by people who hoped it would eat up insects and the black garden slug. It cleaned up most of the slugs since so few are seen today. Feeding mostly at night, the toads catch insects by zapping them with their long sticky tongues. Toads are common throughout Guam and can be seen on streets and lawns during the rainy season. They reach a size of about five inches (13 cm) in body length.

Toads produce a thick white milky substance on their skin which is poisonous and keeps animals like dogs and cats from eating them. They are otherwise harmless and will not give people warts. But children should be taught to wash their hands after handling them and should not put them in their mouths, since the toad's protective juice could make them sick.

The eastern dwarf tree frog is much smaller than the toad, reaching only about an inch (2.5 cm) in length. It gets its name because it lives in trees and bushes, and rarely comes to the ground. Its green coloration helps it hide among the leaves. These frogs are more likely to be heard than seen. They give a call that sounds like "reek, reek, reek", which is repeated many times. Calling is heard most often near areas of freshwater where they gather to breed. Tree frogs are not native to Guam. They were probably accidentally brought to our island in the 1960s and are now common in areas of southern and central Guam, especially near ponds and wetlands. They are native to eastern Australia.

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ATUHONG (Humphead Parrotfish)

Bolbometopon muricatum

The atuhong is the largest of all the parrotfishes, reaching a weight of at least 150 pounds (68 kg). Only one other green fish, the tangison or Humphead Wrasse, reaches such a large size. The tangison has a normal, fish-like protruding snout with thick fleshy lips while the atuhong has a vertical head profile and teeth fused into a beak that is not covered by the lips.

Unlike most parrotfishes, adult atuhong of both sexes are similarly colored. They are uniformly dark green with the leading edge of the head light green to pink. The outer surface of the beak is nodular rather than smooth. Young fish, known as pachak, are dull gray to brown with scattered white spots. The characteristic steep forehead begins to develop at a rather small size of about eight inches. Medium sized individuals with a steep head profile are known in Chamoru as påtgon atuhong.

Most parrotfishes feed on the thin film of algae scraped from the outer surface of dead coral or rock. The atuhong is the only parrotfish that feeds substantially on live corals. The crunching sound of the fish biting into the coral can be heard for quite a distance underwater. It is reputed to use its humped forehead to ram corals so they can be broken into more manageable pieces. Atuhong typically travel in groups along upper edges of outer channel or seaward reef slopes, but are extremely wary and difficult to approach closely. However, they have the unfortunate habit of sleeping in large groups under ledges where they are accessible to spearfishermen. At night, scuba-equipped spearfishermen can wipe out entire groups at all depths they are known to sleep. Although little is known of the biology of the atuhong, they probably grow slowly and take many years to mature. This makes them highly vulnerable to overfishing. Today there are very few atuhong left, and most of these are found in the less accessible northern part of the island.

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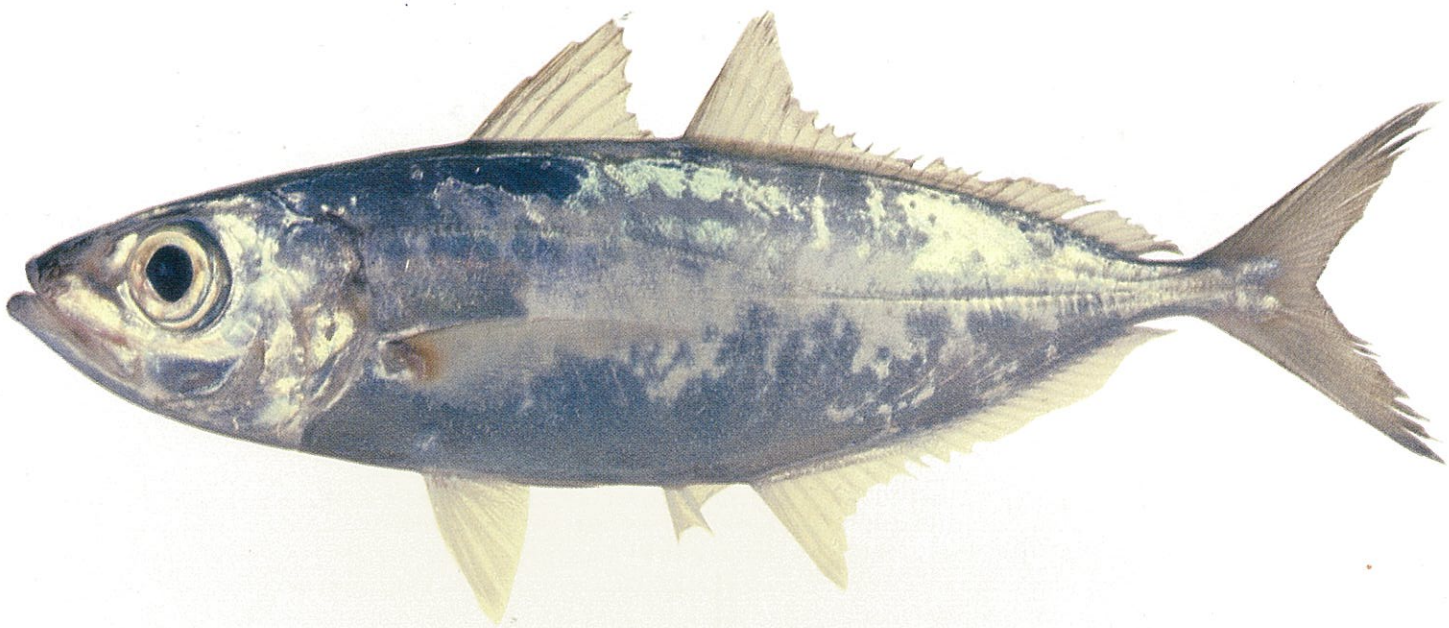

ATULAI (Bigeye Scad)

Selar crumenophthalmus

The bigeye scad or atulai, as it is called in Chamoru, is an important foodfish found in all tropical seas. It is in the same family as the jacks (i'e', etc.). The combination of large eye and compressed body help distinguish it from other mackerel-like scads. The scutes (a lateral row of bony ridged scales forming a keel at the base of the tail) distinguish it from similar-looking small mackerels of the tuna family.

Atulai spend most of their time in deep nearshore waters beyond the edge of the reef. During certain times of the year, they migrate to shallow bays and channels where they form large schools. When inshore, they feed on small benthic (bottom-dwelling) invertebrates, foraminifera, and shrimp. When offshore, they feed on zooplankton and fish larvae.

Atulai reach a size of 15 inches (38 cm), but are rarely more than 10 inches (25 cm) at Guam. On moonless nights, atulai beyond the reef, can be attracted to lights set in the water beneath fishing boats and caught with hook and line. When inshore, atulai are harvested by nets and hook and line during the daytime. It is not unusual to see a large crowd of anglers fishing for atulai in and around the Agana Boat Basin area when atulai are running. Chamorus call this "tiempon atulai" or atulai time. Sometimes a large net is set across an entire bay to trap the atulai. A large group of people help close the net and harvest the atulai. Several thousand pounds can be harvested this way.

Atulai may also move between islands or island groups since they are not always present near Guam. Little is known of these offshore movements. While there is no consistent season for harvesting atulai, the best months for atulai fishing seem to be from August to November.

Photo © Richard C. Wass

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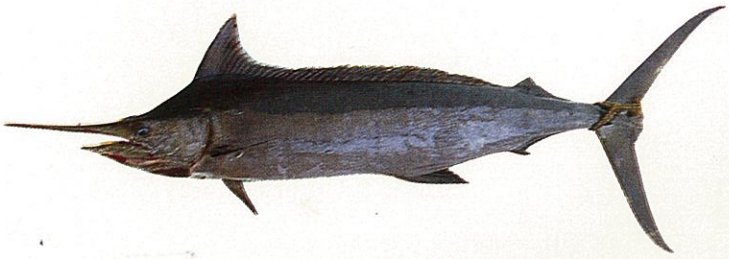
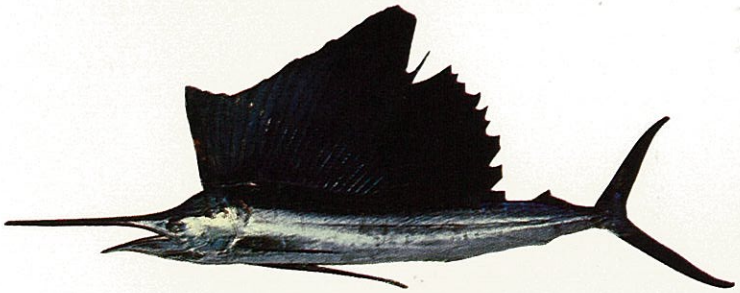
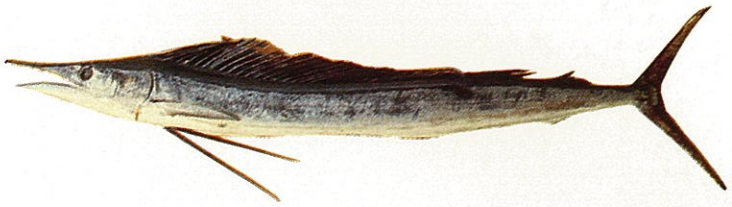
BILLFISHES



BÅTTO′ (Indo-Pacific blue marlin)
Makaira mazara



GUIHAN LÅYAK
(Indo-Pacific sailfish)
Istiophorus platypterus



Shortbill spearfish
Tetrapterus angustirostris

Photos © Robert F. Myers

Billfishes are sleek tuna-like fishes with the upper jaw extended into a long, bony spear.

There are six kinds of billfishes found in Guam's waters. The most abundant kind is the Indo-Pacific blue marlin. Sailfish are relatively uncommon and spearfish, black marlin, and striped marlin are rare. The broadbill swordfish also occurs on Guam, but only in the deeper, cooler waters fished by longline. All billfishes are highly migratory, and all but the swordfish are caught by trolling with lures or live bait.

The Indo-Pacific blue marlin or båtto' as it is called in Chamoru, is the world's largest species of billfish, reaching a fork length of nearly 15 feet (4.6 m) and weight of about 2,500 pounds (1,134 kg; measured from the tip of the lower jaw to the notch in the middle of the tail). The largest ever caught on sport fishing tackle weighed 1,805 pounds (819 kg). For many years the all-tackle world record was held by a 1,153 pound (523 kg) fish caught off Guam.

Båtto' occur in all warm seas with temperatures above 68°F (20°C). They inhabit offshore waters from the surface to depths of over 600 feet (182 m). Båtto' feed primarily on tunas and other pelagic fishes, and to a lesser extent, on post-larval reef fishes and squids. They grow rapidly, reaching a weight of about 100 pounds (45 kg) by the age of four to eight years. Females grow faster and attain a much larger size than do males which only reach a weight of about 300 pounds (136 kg). Females can live for more than 16 years. Båtto' are most abundant near Guam during the summer months. Most of the locally-caught marlin are males weighing between 100 to 200 pounds (45 to 90 kg). Recent annual landings by the local small boat fleet have ranged from 15 to 68 tons (14 to 62 MT).

Båtto' occur in all seas warmer than 72°F (22°C) and seem to be most abundant near land masses, occasionally in waters as shallow as 40 feet (12 m). They feed primarily on pelagic fishes and squids, but occasionally feed on bottomfishes and crustaceans. The sailfish is the fastest fish known, capable of speeds as high as 68 miles per hour (109 km/hr). They are caught throughout the year in Guam's waters, but are never abundant with annual catches by the small boat fleet always below three tons. Sailfish reach a weight of 221 pounds (100 kg).

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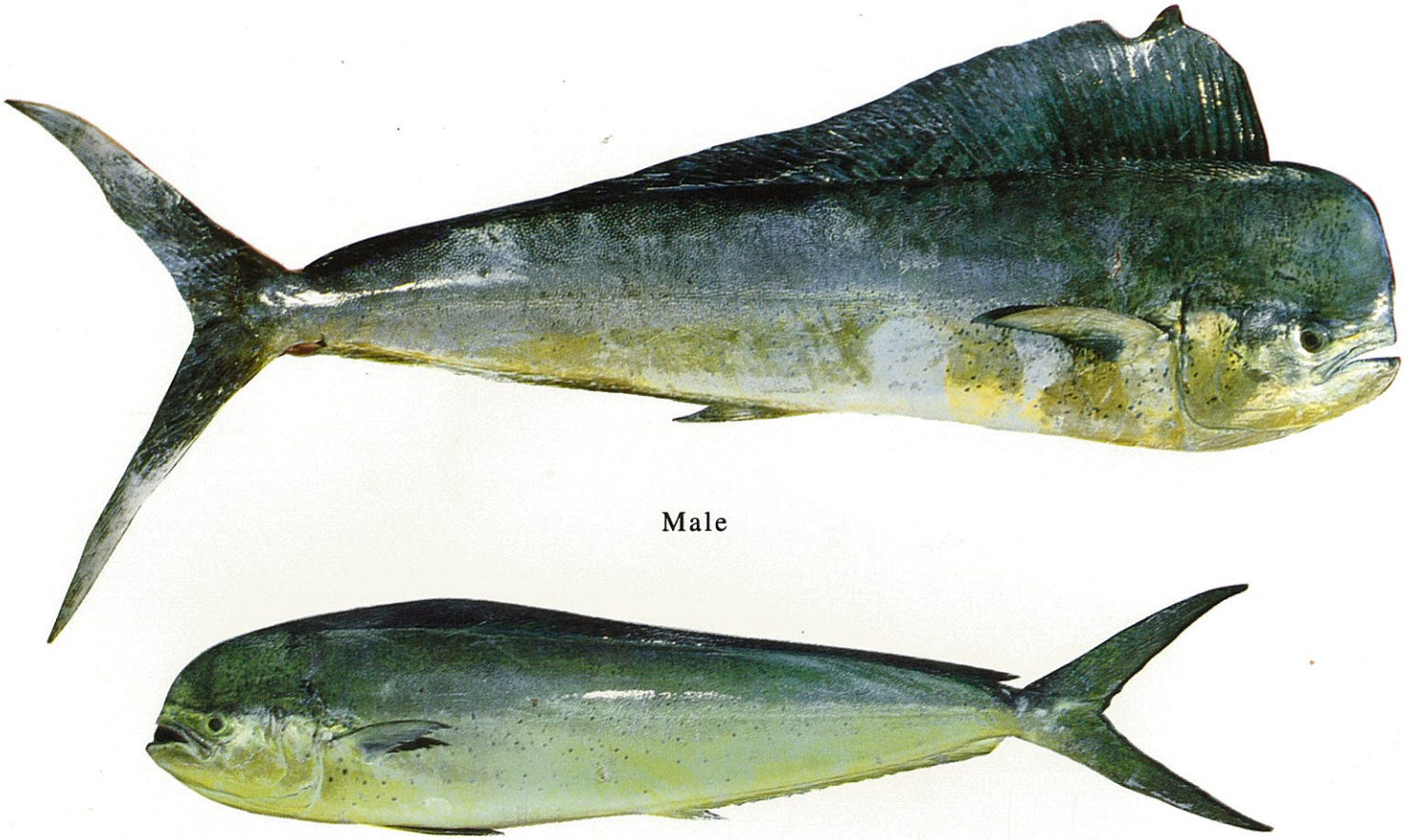

Male

Female

BOTAGUE (Måhimåhi) *Coryphaena hippurus*

The måhimåhi or botague, as it is called in Chamoru, also known as dolphinfish throughout much of the world, is an important food and game fish found in all tropical seas. It migrates into temperate seas during the warmest months of the year. Botague are surface dwelling fish of the open sea, often found near floating objects which attract and offer limited protection to the small fishes upon which they feed. They feed primarily on flying fishes, which are followed even when in flight and seized as they drop back into the water. This requires excellent eyesight and the ability to swim at speeds as high as 50 miles per hour (80 km/hr).

Botague are migratory and highly seasonal in Guam's waters, although a few occur throughout the year. They are most abundant from February to April and most often caught when the water is moderately rough. In the northwest Pacific, botague spawn in mid-summer when the bulk of the migration is off southern Japan. Those that are ready to spawn are rare near Guam. Each female produces up to several hundred thousand eggs. Juveniles tend to concentrate around floating objects such as seaweed, and may even be eaten by adults. Botague grow extremely fast. One aquarium-reared fish grew from one to 37 pounds (17 kg) in eight months. Nearly all the botague caught in Guam's waters are less than a year old. Botague can live up to five years, but rarely live longer than three years. They can reach a fork length of 5 feet, nine inches (1.75 m; measured from the tip of the snout to the notch in the middle of the tail). The largest botague on record weighed 87 pounds (39.5 kg), and the largest caught near Guam was 52 pounds (24 kg). Botague are caught primarly by trolling with lures or squid. Their year to year abundance near Guam is quite variable, with recent annual landings from small boats ranging from 14 to 155 tons (13 to 141 MT). In good years, botague landings exceed those of all other locally-caught fishes.

Photos © Robert F. Myers

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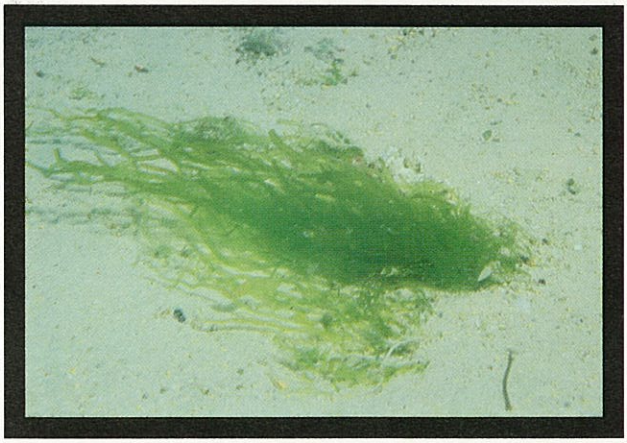
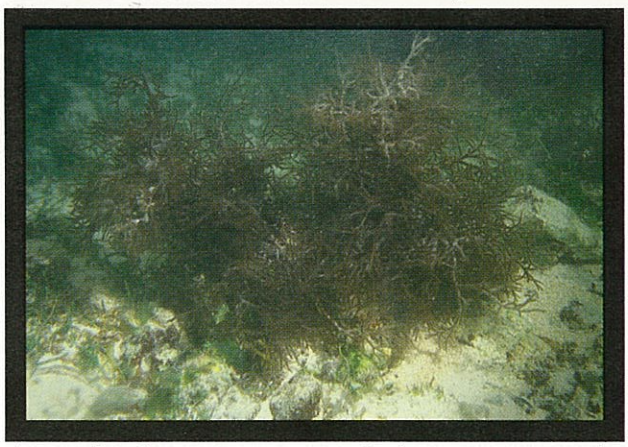
CHA'GUAN TÅSI
(Seaweeds)

ADO' (Sea grapes) *Caulerpa racemosa*

CHAIGUAN *Sargassum cristaefolium*



LUMOT *Enteromorpha clathrata*



A red algae *Polycavernosa tsudai*

Upper two photos © Robert F. Myers

The terms "seaweed" or "cha'guan tåsi" as they are called in Chamoru, are popularly applied to any plant-like organism living in the ocean. In fact, most of these marine plants are quite diffferent from plants found on land. Only the seagrasses are true flowering plants similar in structure and lifestyle to most of the land plants we are familiar with. There are only three kinds of seagrasses on Guam. One of them grows in extensive beds which form a very important habitat for juvenile fishes (see Marine Habitats).

Unlike seagrasses, seaweeds are algae which are much simpler in structure and lack true roots, stems and leaves. Some kinds of algae are single-celled organisms that live freely or form colonies of brown to green slime. Others are larger and have visible structures reminiscent of higher plants such as blades which resemble leaves, holdfasts or rhizoids which resemble roots, and stipes that resemble stems. Seaweeds absorb nutrients through their entire outer surface rather than through roots and their holdfasts are used only for attachment. Seaweeds do not have flowers or seeds, but reproduce either asexually by means of spores or fragmentation and sexually by means of gametes. All marine plants are found only in water shallow enough for sunlight to reach them. Like land plants, they form the basis of the food chain.

There are over 220 kinds of algae on Guam. They are classified into four divisions based on pigmentation and lifestyles. The blue-greens (Cyanophyta) are primarily single-celled or colonial froms that may form slimes and small clumps. The greens (Chlorophyta), browns (Phaeophyta), and reds (Rhodophyta) are generally larger typical seaweeds and are usually the color closest to their namesakes. Some of the greens and reds incorporate a great deal of calcium to give them a hard, segmented structure. Some reds, the coralline algae, form hard coral-like crusts or clumps and help "cement" dead coral, rubble, and sand into larger and harder structures.

Several kinds of algae have traditional uses. Some are edible while others are used as bait. The most common edible kind is ado' or sea grapes, a green algae so named because of its small clusters of grape-like spheres. Recently, several people died from ingesting an extremely toxic poison associated with the red algae *Polycavernosa tsudai*, a species that was commonly harvested and even sold in stores. Despite extensive scientific study, the origin and identity of the poison remains a mystery, and this seaweed should no longer be eaten. Many kinds of seaweeds have toxic properties and only those properly identified and with a long history of safety should be eaten. Some kinds of seaweeds are attached to hook and line as bait for certain fishes. The slimy stringy green "lumot" is used to catch adult hiteng and sesyon (rabbitfishes) and the hard, leafy brown "chaiguan" is used to catch tataga' (bluespine unicornfish).

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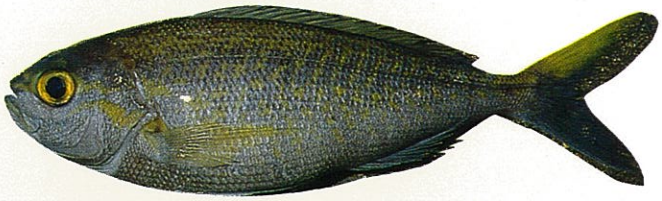
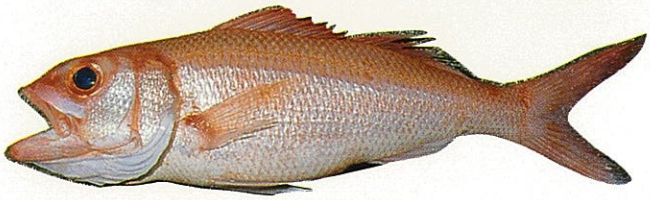
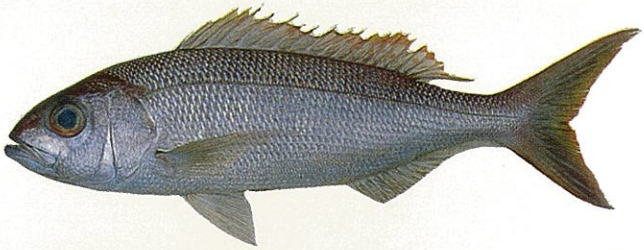
LEHI (Lehi) *Aphareus rutilans*



BUNINAS (Yellowtail kalikali) *Pristipomoides auricilla*



BUNINAS AGAGA′ (Ehu) *Etelis carbunculus*



PÅKÅPÅKÅ (Pink opakapaka) *Pristipomoides filamentosus*

ABUNINAS (Onaga) *Etelis coruscans*

BUNINAS RAYAO AMARIYU (Gindai) *Pristipomoides zonatus*

DEEPWATER SNAPPERS

Snappers are robust-bodied highly-valued food fishes. There are at least 23 kinds of snappers in Guam's waters, 12 of which live in deep water, primarily at depths of 500 to 1,200 feet (152 to 366 m). They are caught primarily by bottomfishing near deep underwater pinnacles and cliffs. The deepwater snappers feed primarily on large planktonic animals such as larval crustaceans and tunicates (a jelly-like animal that feeds on zooplankton filtered from the water), but also eat other fishes and crustaceans.

The onaga is the most highly-prized deepwater snapper. This beautiful fish reaches a length of over 47 inches (120 cm) and weight of 44 pounds (20 kg) but is relatively uncommon. The lehi has a similar shape and also reaches a large size of 43 inches (110 cm). It is somewhat more common than the onaga. The ehu is red like the onaga, but does not develop long tail filaments. It gets as large as the onaga, to at least 46 pounds (21 kg), but is usually much smaller and is caught more frequently than the preceding snappers. The yellowtail kalikali and gindai are the most frequently caught deepwater bottomfishes at Guam. They are smaller than most of their relatives, and reach a size of 18 and 20 inches, respectively (45 cm and 50 cm). The pink opakapaka reaches a size of 31.5 inches (80 cm) and age of 18 years. It is less often caught than the preceding two snappers.

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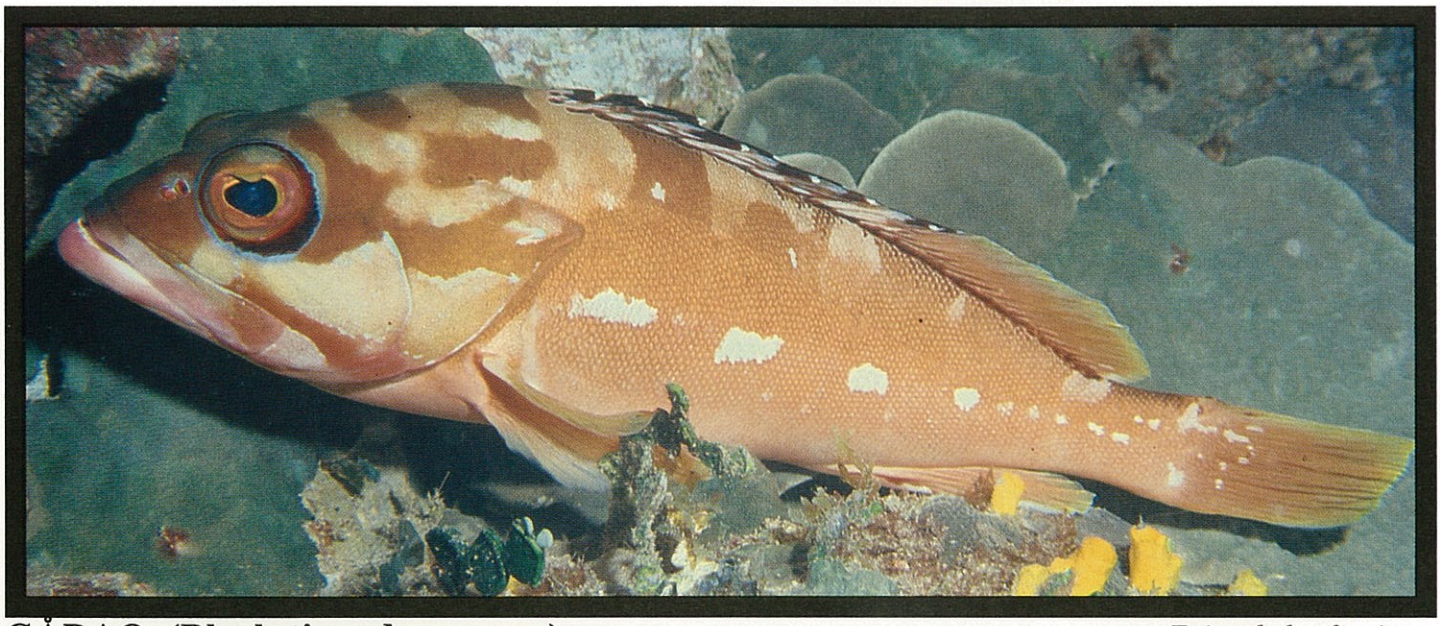
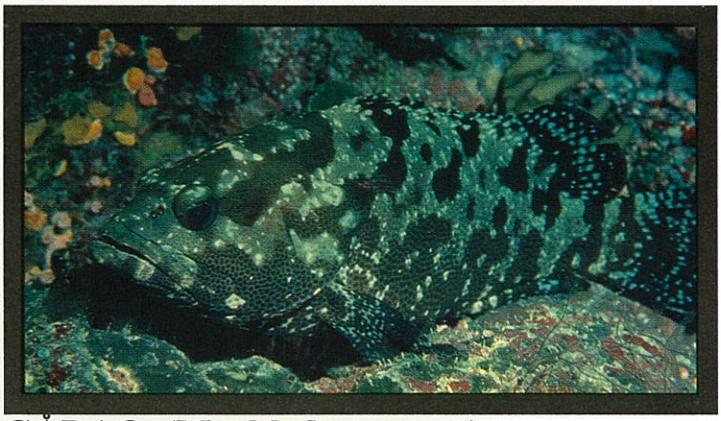


GÅDAO (Black-tipped grouper) *Epinephelus fasciatus*

GÅDAO PENTO (Honeycomb Grouper) *Epinephelus merra*



GÅDAO (Marbled grouper) *Epinephelus polyphekadion*

Photos © Robert F. Myers

GÅDAO (Groupers)

Gådao are robust-bodied, large-mouthed predators of fishes and invertebrates. They are highly valued foodfishes caught by bottomfishing or spearfishing. There are at least 29 kinds of gådao in Guam's waters. They inhabit a variety of reef habitats ranging from shallow reef flats to depths of over 800 feet (244 m). They are aggressive predators that are among the first to take a baited hook. This aggresiveness also makes them vulnerable to overfishing, and large kinds of gådao that take a long time to mature are no longer common around Guam. The smaller kinds grow fast and get a chance to reproduce before getting caught, so they remain common.

Gådao are sequential hermaphrodites, that is, they start out as females, then later change sex to become males. The marbled grouper is typical of many of the medium to large kinds. Its cryptic color of blotches and spots makes it very difficult to see as it stalks prey or sits and waits for prey to come its way. It inhabits waters of deep lagoons and the outer reef slope from below the surge zone to at least 150 feet (46 m) and reaches a size of 29 inches (73 cm).

The black-tipped grouper is the most commonly caught grouper by bottomfishing. It is a small species that reaches a length of about 14 inches (35 cm) and lives on the outer reef slope at depths of about 33 to 525 feet (10 to 160 m). The honeycomb grouper is a small species that reaches a length of 11 inches (28 cm). It is quite common on reef flats but also inhabits outer reef waters to a depth of 165 feet (50 m).

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Photo © Robert F. Myers

GUILI (Rudderfish)

Kyphosus vaigiensis

Guili are important traditional foodfishes caught primarily by talåya (cast net), spearfishing, and rod and reel. They have small mouths with small closely-set incisiform teeth (shaped like human front teeth). They feed primarily on plants, including the thin layer of green filamentous algae as well as on larger seaweeds. They also eat small bottom living animals and sewage. They are most numerous along the reef margin and steep rocky areas which are often wave-swept and dangerous. It takes great skill with the talåya to catch them. Young guili are commonly found far out at sea beneath floating debris.

There are three kinds of guili in the Marianas but only two are common. They are the highfin rudderfish (*Kyphosus cinerascens*) and the lowfin rudderfish (*K. vaigiensis*). They can be distinguished by the height of the soft-rayed portion of the dorsal (upper) fin. On the highfin rudderfish, this part is nearly twice as high as the spiny part of the dorsal fin and on the lowfin rudderfish, both parts are about equal in height.

All three guili have both light silvery-gray and dark color phases as well as a light-spotted phase occasionally seen underwater. Although the species of guili are not distinguished by local fishermen, the color phases are. The lighter phase is known locally as guili and the dark phase is known as guilen puengi (puengi is the Chamoru word for night or dark). Chamorus call small guili under about 10 inches (25 cm) "geppan" because they move rapidly about the upper portion of the reef. The highfin rudderfish reaches a length of about 19 inches (48 cm) and the lowfin rudderfish reaches a length of about 26 inches (66 cm).

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Photo © Robert F. Myers

HALU'U (Gray Reef Shark)

Carcharhinus amblyrhynchos

Sharks or halu'u (a general term used by Chamorus for all sharks), differ from other fishes in many ways. Their skin is covered with tiny dermal denticles that are structurally similar to teeth. This gives the skin a rough, sandpaper-like texture. The teeth are actually modified dermal denticles that are continuously formed in rows on the inner surface of the jaws. When an outer tooth is lost, the next available inner tooth takes its place. The fins of sharks have the same skin and texture as the rest of the body and are still at their bases so they can't be folded as in most other fishes. A complex system of pores around the head and sides, coupled with a pair of inner ears enable sharks to detect the vibrations and sounds produced by fishes and other animals at great distances. At closer range, an acute sense of smell enables halu'u to detect minute concentrations of blood or other body fluids from potential prey. Sight is limited by the clarity of the water. At close range, halu'u have an amazing ability to detect the minute electrical fields given off by all living creatures. This enables them to locate prey in complete darkness or hidden beneath the sand. Some halu'u may also use anomolies in the magnetic field of the earth to navigate in what we perceive to be featureless open sea.

There are over 12 species of halu'u in Guam's waters. Most are harmless unless stimulated or provoked. The reef whitetip shark (*Triaenodon obesus*), reef blacktip shark (*Carcharhinus melanopterus*) and gray reef shark are the most common sharks on shallow reefs. They are small, reaching a length of about six feet (1.8 m). The gray reef shark can be quite aggressive and territorial and has been known to cause severe but non-fatal bites. The other two generally flee when approached. The tiger shark (*Galeocerdo cuvieri*) is our most dangerous species. It grows to a length of about 18 feet (5.5 m), will eat almost anything, and has been known to attack and eat divers. Fortunately, it spends most of the daylight hours in water over 200 feet (60 m) deep where encounters with humans are unlikely. However, it occasionally enters shallow water at night or anytime when attracted by dead animals or garbage, or when breeding. Halu'u are at the top of the coral reef food chain. They play an important role in the balance of nature and should not be indiscriminately killed. Halu'u are extremely vulnerable to overfishing. Although they are generally not kept for food, they are often killed when caught so their population is lower here than in more remote areas.

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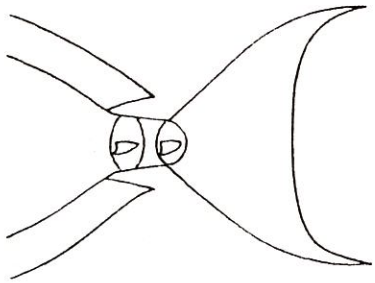
1994

Photo © Robert F. Myers

HANGON (Orangespine Unicornfish)

Naso lituratus

The hangon, as it is called in Chamoru, is a popular foodfish. It is one of a group of so-called unicornfishes that do not develop a horn on the forehead. Most unicornfishes have two pairs of sharp blade-like spines at the base of the tail. These are used for defense and can easily cut the hand of a careless fisherman. The orange color around the base of the tail may serve as a warning to potential predators that it is dangerous to capture and eat.



Location of blades

Adult hangon develop long trailing filaments on the top and bottom of the tail and reach a length of about 12 inches (30 cm), excluding the tail filaments. Hangon inhabit shallow reefs, usually in areas of clear water with a hard-bottom and coral growth to a depth of at least 150 feet (46 m). They feed on filamentous algae that they scrape from the surfaces of dead coral and rock. They occur singly or in groups and sleep among corals at night. Small hangon are suitable as aquariumfishes. Larger hangon are a popular foodfish. They are captured primarily by spearfishing and occasionally by gill net or surround net. At least two other kinds of unicornfishes have a smooth head profile, the smoothhead unicornfish (*Naso hexacanthus*) and the Gray unicornfish (*N. caesius*), both called tataga' tahdong, but they lack the orange markings of the hangon.

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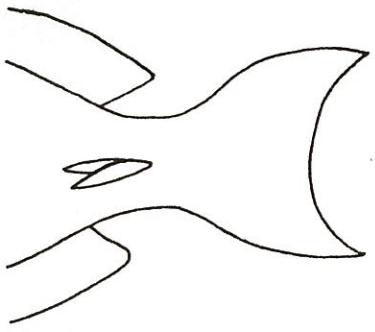
Photo © Robert F. Myers

HIYOK (Bluebanded Surgeonfish)

Acanthurus lineatus

Surgeonfishes get their name from a pair of sharp retractible bladelike spines at the base of the tail. These are used for defense and can easily cut the hand of a careless fisherman. The blade of the hiyok is hidden in a groove located in the middle on one of its blue stripes. All of Guam's surgeonfishes are good to eat.

Hiyok occur in areas of shallow clear water that get some wave action. They are most common along the seaward reef margin, but may also occur on outer reef flats and the upper edge of lagoon reefs. They are usually found in small groups, consisting of a territorial male and several females. Hiyok feed on filamentous algae cropped from the surfaces of dead coral or rock. They are among the more aggressive of surgeonfishes and defend a patch of reef against other algae-eating fishes such as parrotfishes, rabbitfishes, and other surgeonfishes. Small hiyok are popular aquariumfishes, but require a large tank with clear, well-oxygenated water. Hiyok reach a length of about 11 inches (28 cm) and are most often caught by tokcha' guihan (fish spear), but may also be caught by talåya (cast net), tekken (gill net), and chenchulu (surround net).



Location of blade

There are several other kinds of surgeonfishes. Many of these are blue, brown, or black. They are known as "hugupao."

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KAKA'KA'
(Snappers)

FUNAI (Blue-lined snapper) *Lutjanus kasmira*

KAKA'KA' (Flametail snapper) *Lutjanus fulvus*

BUA (Onespot snapper) *Lutjanus monostigmus*

Snappers are robust-bodied highly valued food fishes. They are caught primarily by bottomfishing, gill net, and spearfishing. There are at least 23 kinds of snappers in Guam's waters, 11 of which occur in shallow reef waters. A few of these also occur deeper than 330 ft (100 m). The shallow water snappers have large mouths and are aggressive predators of fishes and crustaceans. One kind of snapper, the tagåfi or red snapper, is frequently poisonous when it reaches a large size. Individuals of this species that weigh more than about 9 pounds (4 kg) should not be eaten. The other kinds of snappers are usually safe to eat.

Many species of snappers live in deep water, primarily at depths of about about 500 to 1,200 feet (152 to 366 m). These feed primarily on large planktonic animals such as larval crustaceans and tunicates (a jelly-like animal that feeds on zooplankton filtered from the water), but also eat other fishes and crustaceans.

The funai (blue-lined snapper) lives in a wide variety of reef habitats ranging from shallow inner lagoons to a depth of at least 500 feet (152 m). During the day, it often occurs in large aggregations around ledges and caves. At night it disperses to feed on fishes and bottom dwelling crustaceans.

The kaka'ka' (flametail snapper) lives in lagoon and outer reef areas at depths of 3 to 250 feet (1 to 76 m). It prefers sheltered areas with deep holes or boulders and sometimes enters mangrove areas. It is not as common as the blue-lined snapper, and does not occur in large schools.

The bua (onespot snapper) lives in outer lagoon and seaward reefs from the outer reef flat to a depth of at least 200 feet (60 m). It prefers areas with deep cuts and holes and occurs singly or in small groups.

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1994

Photo © Robert F. Myers

KICHU (Convict Tang)

Acanthurus triostegus

The kichu is one of the smallest surgeonfishes. Surgeonfishes get their name from a pair of sharp retractible bladelike spines at the base of the tail. These are used for defense and can easily cut the hand of a careless fisherman. The blade of the kichu is smaller and less dangerous than that of most other surgeonfishes. All of Guam's surgeonfishes are good to eat.

The kichu is one of Guam's most abundant surgeonfishes, occurring in most hard-bottomed areas from the shoreline to over 100 feet (30 m) deep. It is most abundant on outer reef flats and shallow lagoon and seaward reef slopes. Kichu feed on filamentous algae cropped from the surfaces of dead coral and rock. They occur as either scattered individuals or in large schools, sometimes with other algae-eating fishes such as parrotfishes, rabbitfishes, and other surgeonfishes. When alone, they are easily driven away from the territories of certain algae-eating fishes like the hiyok (Bluebanded Surgeonfish). However, when in a large swarming school they are able to overcome the best territorial defenses.

Juvenile kichu settle from the plankton at a length of about one inch (2.5 cm) and after about two months at sea. They spend their first several weeks in tidepools or among patches of coral rubble until they get larger and start roaming the reef. Adults aggregate at certain sites along the reef edge or in channel mouths to spawn. Spawning occurs at dusk among small groups that break away from the aggregation. Kichu are caught by talåya (cast net), tekken (gill net), chenchulu (surround net), and tokcha' (spear).

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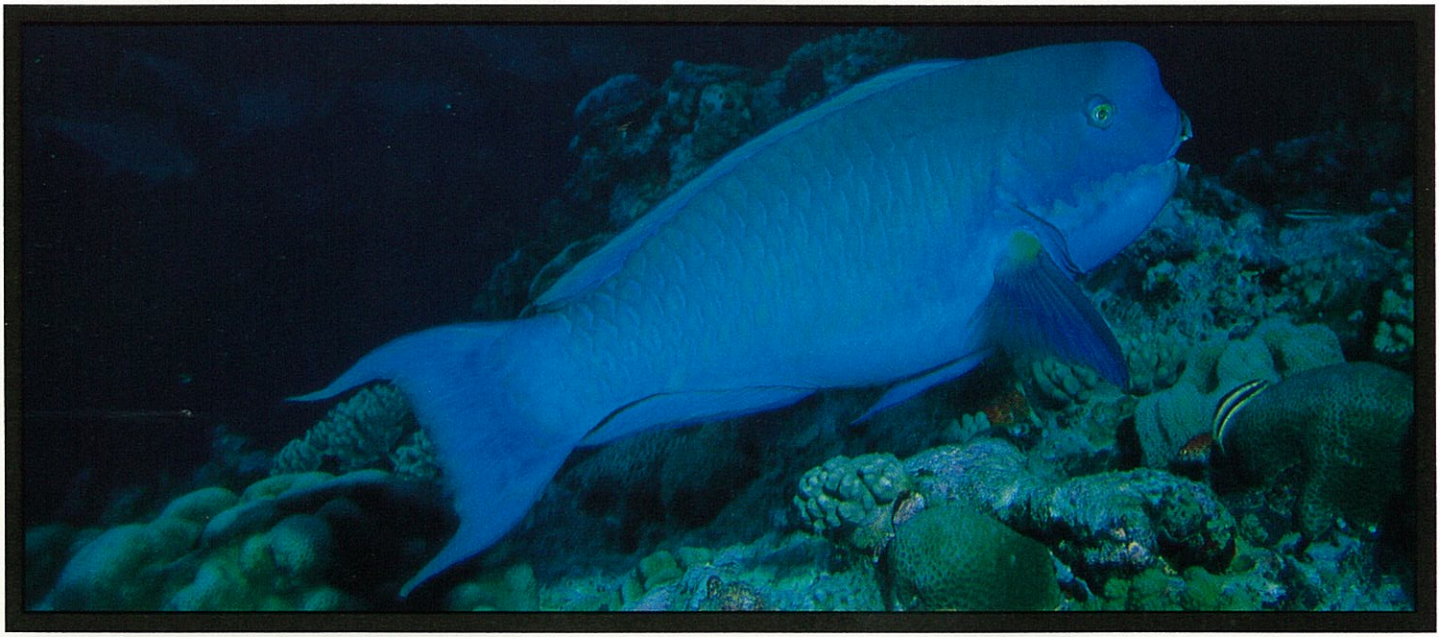
1994



Above: Terminal phase (lågguan asut), always male

Left: Juvenile

Right:: Initial phase (palakse'), male or female

Photos © Robert F. Myers

LÅGGUA
(Steephead Parrotfish) *Scarus microrhinos*

Parrotfishes are closely related to the wrasses (called a'aga in Chamoru), but have teeth that are fused into a distinctive beak. They use their beak to scrape green filamentous algae from the surfaces of dead coral or rock. They also eat large amounts of the dead coral rock that are scraped loose by their beaks. The scraped particles are passed through and settle on the bottom as sand. Some parrotfishes also eat leafy seaweeds or coral. Most parrotfishes travel and feed in groups, sometimes mixed with other algae-eating fishes such as surgeonfishes and rabbitfishes. All parrotfishes sleep on the bottom at night, often tucked away into a hole.

Juvenile parrotfishes are drably colored, usually brown to gray and often striped when less than about two inches long. Larger juveniles, females, and some males of most kinds are brown or gray (these are called palakse'). This is known as the initial phase because both male and female parrotfishes have this color phase after they lose their juvenile color. Some of the largest females eventually change both color and sex to a brilliant and mostly blue and green color phase (these are called låggua). This is called the terminal phase. All terminal phase fish are males that started out as females. Males that started out as males cannot change to the terminal phase color pattern and cannot change sex. The steephead parrotfish reaches a size of about 28 inches (70 cm). Late initial phase individuals of this species become blue green like the terminal phase, but do not have as steep a forehead. These are still called palakse'. When they develop a vertical forehead, they are called "lågguan asut". Parrotfishes are important food fishes. They are caught by nets and spears, but usually will not take a hook. There are 19 different kinds of parrotfishes on Guam.

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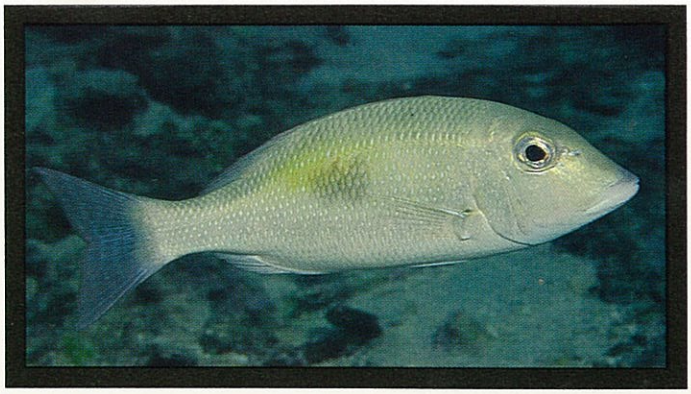
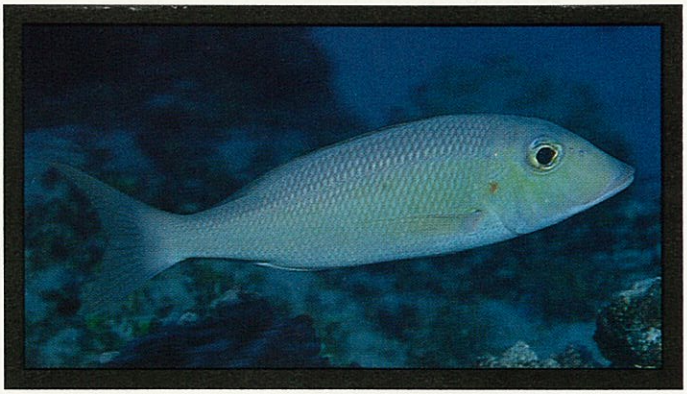
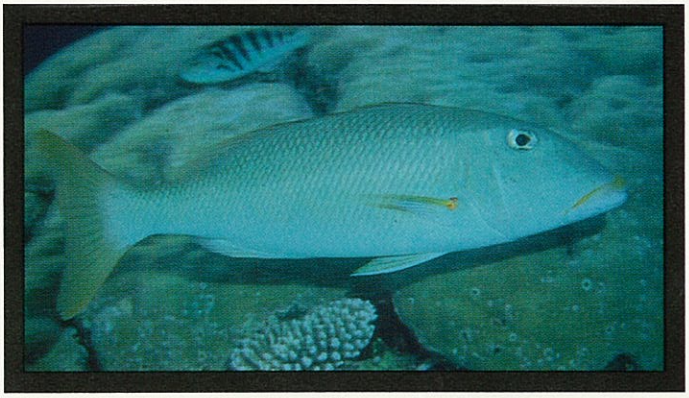
MAFUTE'/LILILOK/ MÅTAN HÅGON (Emperors)



MAFUTE' (Black-spot emperor)
Lethrinus harak



MAFUTE' (Redgill emperor)
Lethrinus rubrioperculatus



LILILOK (Yellowlip emperor)
Lethrinus xanthochilus

MÅTAN HÅGON (Bigeye emperor)
Monotaxis grandoculus

Photos © Robert F. Myers

Emperors are oblong snapperlike fishes that are a very important traditional food source. There are about 16 kinds of emperors in Guam's waters. These include five kinds of måtan hågon, palakse', and nine kinds of mafute' and lililok. Most kinds of emperors root in the sand for invertebrates like mollusks, worms, crustaceans, and sea urchins. These emperors usually have molars or stout conical teeth in their jaws for crushing hard-shelled prey. Some mafute' also feed on fishes and lililok feed mainly on fishes. Many kinds of mafute' and lililok are capable of rapid changes in coloration and often have a pattern of dark reticulations or blotches that make them difficult to distinguish from one another. Emperors are caught by hook and line, tekken, and spear.

The black-spot emperor is one of the most common kinds of mafute' in shallow reef waters. It lives in sandy areas with seagrasses or scattered corals and feeds mainly on invertebrates. This mafute' reaches a length of 14 inches (35 cm).

The redgill emperor is the most common emperor outside the reef at depths of 40 to 500 feet (12 to 152 m). It lives in sandy areas and reaches a length of over 16 inches (40 cm).

Lililok (yellowlip emperor) have a longer snout than the mafute' and also get larger. The yellowlip emperor is the most common lililok in shallow reef waters. It prefers areas of mixed sand, coral, and rubble as well as seagrass beds and feeds on hard-shelled invertebrates as well as fishes. It reaches a length of 24 inches (60 cm).

Måtan hågon get larger than mafute' and have deeper bodies and larger eyes. Only one kind of måtan hågon, the bigeye emperor, is common in shallow reef waters. It is usually found on the seaward reef slope. In the daytime it may occur in groups hovering close to the bottom. At night it moves out over sand to feed. Its very large eye helps it see better at night. It reaches a size of 21 inches (53 cm). Other kinds of bigeye emperor are usually caught by bottomfishing in deeper waters outside the reef at depths of 100 to 600 feet (30 to 182 m).

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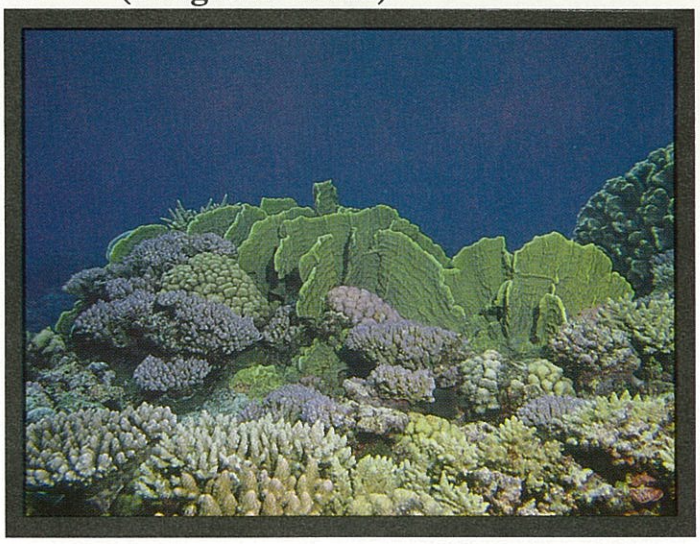
MARINE HABITATS

MÅNGLE (Mangroves and Estuaries)

Mangroves and Estuaries: Coastal areas where freshwater from rivers mixes with the sea are known as estuaries. Thick plant growth along sheltered shorelines and river banks helps coral reefs by filtering silt and pollutants that wash into the rivers. Nutrients washed into the rivers as well as from decaying vegetation feeds phytoplankton that are the basis of the food chain. The shelter provided by plants and abundance of plankton makes estuaries ideal nursery grounds for many kinds of animals. The young of many kinds of reef fishes live in the lower, more saline parts of estuaries before migrating to coral reef habitats. Other kinds of fishes and crustaceans remain in estuaries throughout their adults lives. Mangrove crabs live in burrows among the roots of riverbank trees. All of Guam's native freshwater fishes and shrimps live in the sea as either eggs or larvae and migrate back to rivers, passing through estuaries as tiny young.

LO'U (Seagrass Beds)

Seagrass beds: Seagrasses occur on shallow sheltered reef flats and in lagoons and tend to be most abundant in areas enriched by nutrients washed into the sea by rivers. By trapping silt and decaying plant particles, seagrasses help stabilize the bottom making it more resistent to erosion caused by storm waves. Seagrasses are very important to many kinds of animals. They provide shelter for the young of many kinds of fishes as well as the adults of others. Many animals feed on the growing tips of seagrasses or epiphytic algae that grows on the blades while some feed on the mature blades themselves.



MATTINGAN (Coral Reefs)

Coral reefs: Coral reefs occur where the water is shallow, consistently clear, fully saline, relatively clean, and the bottom is stable enough to provide for the settlement and growth of corals. Corals are the building blocks of reefs and coralline algae the cement that holds the rubble, sand and corals together. Corals grow best in the clear water along the outer edge of the reef. As the reef grows away from the shore, a lagoon may develop on its shoreward side. Guam's coral reefs are home to thousands of species of animals and plants including hundreds of kinds of fishes and shellfishes. Fishes and other animals and plants taken from coral reefs are an indispensible part of Guam's traditional diet. Tourists are attracted to the reef's abundant marine life and clear waters. Pollution and silt that wash into the sea are the biggest threats to our coral reefs. Other threats include destructive fishing practices, illegal harvesting of coral, and overfishing that may upset the ecological balance.

Photos © Robert F. Myers and Gary J. Wiles

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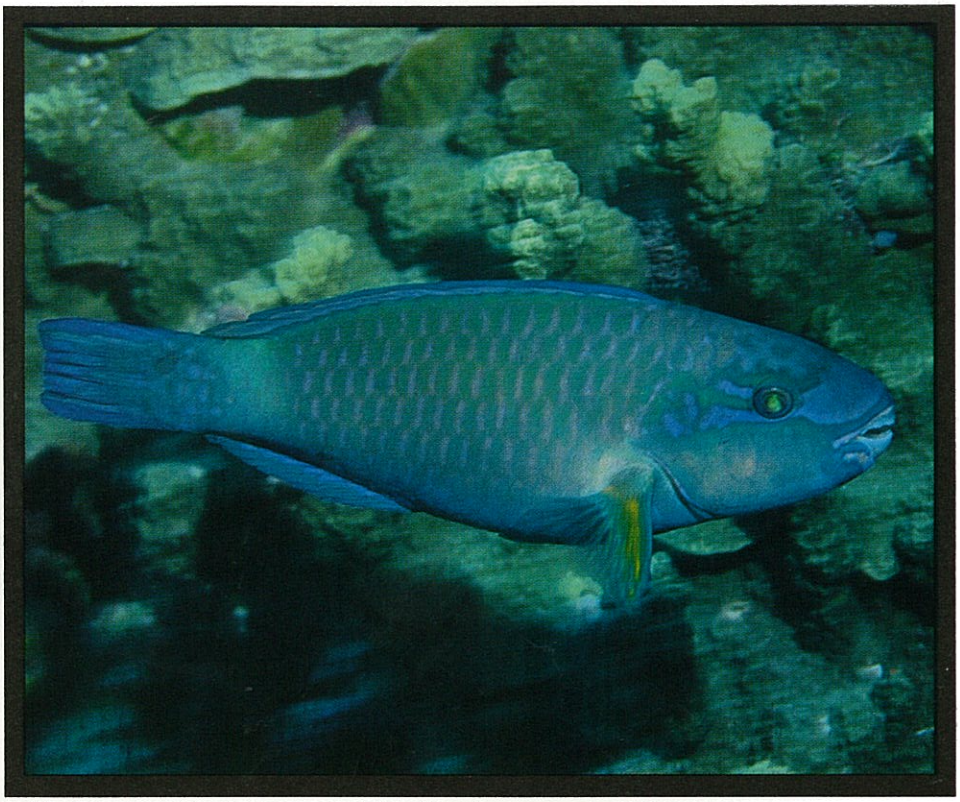
Juvenile



Above: Terminal phase (palakse'), always male
Left: Initial phase (palakse'), male or female

Photos © Robert F. Myers

PALAKSE'/MAGAMHAM
(Bullethead Parrotfish) *Scarus sordidus*

Parrotfishes are closely related to the wrasses (a'aga' and some palakse'), but have teeth that are fused into a distinctive beak. They use their beak to scrape green filamentous algae from the surfaces of dead coral or rock. They also eat large amounts of the dead coral rock that is scraped loose by their beaks. The scraped particles are passed through and settle on the bottom as sand. Some parrotfishes also eat leafy seaweeds or coral. Most parrotfishes travel and feed in groups, sometimes mixed with other algae-eating fishes such as surgeonfishes and rabbitfishes. All parrotfishes sleep on the bottom at night, often tucked away into a hole. Many small kinds of parrotfishes sleep in a clear mucus cocoon. The cocoon protects them from certain predators like moray eels that hunt by sense of smell.

Juvenile parrotfishes are drably colored, usually brown to gray and often striped when less than about two inches long. Larger juveniles, females, and some males of most kinds of parrotfishes are brown or gray. This is known as the initial phase because both male and female parrotfishes have this color phase after they lose their juvenile color. Some of the largest females eventually change both color and sex to a brilliant and mostly blue and green color phase. This is called the terminal phase. All terminal phase fish are males that started out as females. Males that started out as males cannot change to the terminal phase color pattern and cannot change sex. The bullethead parrotfish is a small species that reaches a size of 12 inches (30 cm). For this reason, both initial and terminal phase fish may be called "palakse' ". However, many terminal phase fish develop a tan area on their sides and are called "magåmham". Parrotfishes are important food fishes. They are caught by nets and spears, but will not take a hook. There are 19 different kinds of parrotfishes on Guam.

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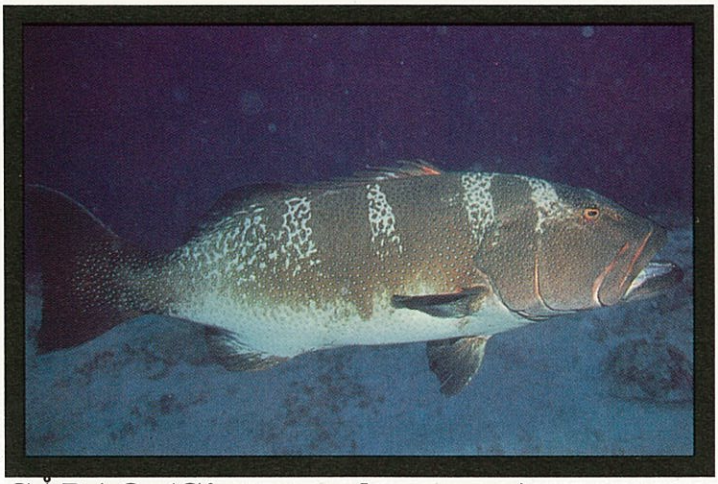
TITOHGE (Giant moray eel)

Gymothorax javanicus

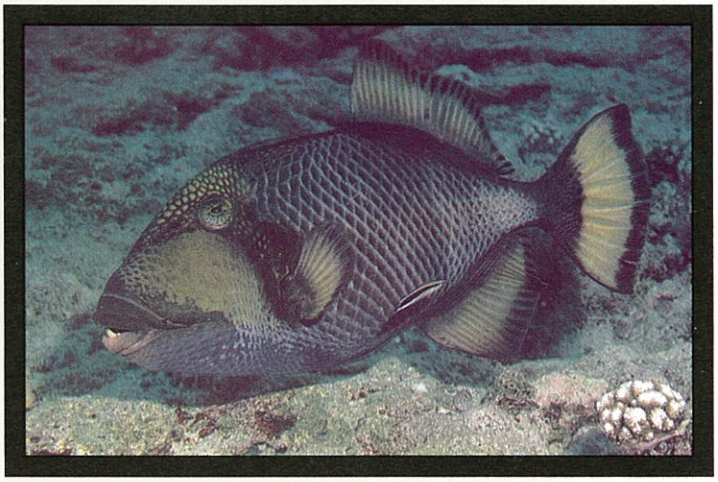
TAGÅFI (Twinspot snapper)

Lutjanus bohar



GÅDAO (Giant coral grouper)

Plectropomus laevis



PULONNON (Titan triggerfish)

Balistoides viridescens

POISONOUS REEF FISHES (Ciguatoxic)

Several kinds of reef fishes may contain a toxin called ciguatera, a neurotoxic substance which affects the nervous system. Ciguatera is produced by a tiny single-celled organism called a dinoflagellate. The dinoflagellate colonizes bare surfaces of the reef as well as man-made surfaces or even blades of seagrass. It is eaten with filamentous algae by herbivorous fishes which are in turn, eaten by predatory fishes. The toxin is not metabolized, but accumulates in the body tissues and becomes most concentrated in the liver and reproductive organs. Each time a predator eats a smaller fish, it accumulates its victim's lifetime accumulation of ciguatera. Consequently, large predatory fishes tend to have the highest concentrations of ciguatera.

On Guam, large tagåfi (red snapper) and large titohge (moray eels) are frequently toxic and should NEVER be eaten. Occasionally, large individuals of other kinds of reef fishes such as gådao (groupers), ålu (barracudas), mamulan (jacks), lililok (emperors), or pulonnon (triggerfishes) may be toxic and should be avoided. The liver and other internal organs of any reef fish should never be eaten. Fortunately, ciguatera is not found in deepwater or pelagic fishes, that is, those caught below 400 feet (122 m) or in the open sea away from the reef.

Symptoms of ciguatera range from a tingling of the lips to reversal of the sensations of hot and cold, muscular weakness, vomiting, diarrhea, shortness of breath and cardiac arrest. Death is rare, but the sickness can last for months. Anyone suspected of suffering from ciguatera should seek medical care immediately.

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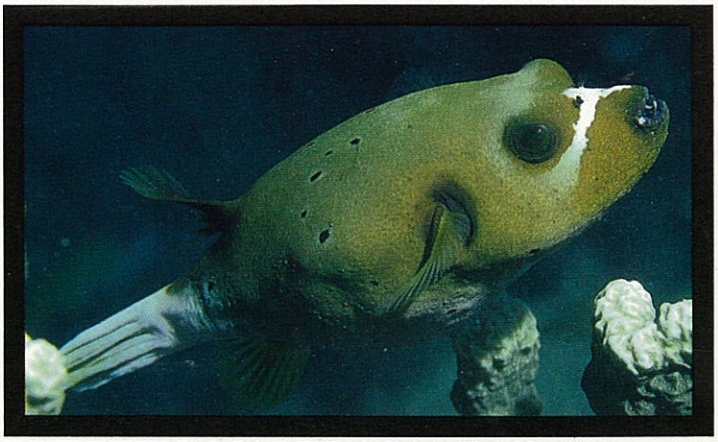
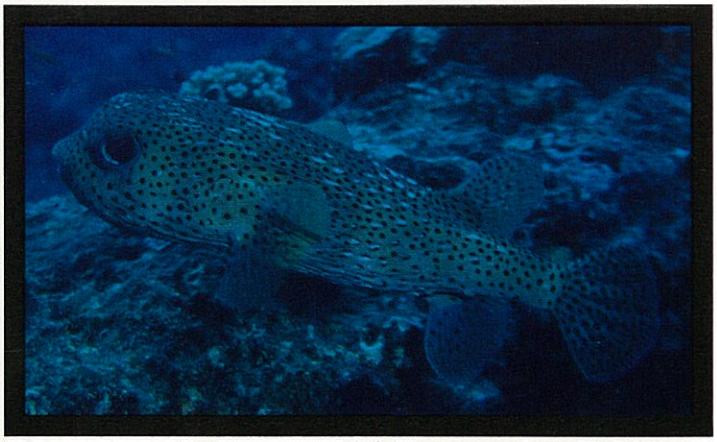
All or part of puffers and porcupinefishes ARE ALWAYS POISONOUS



BUTETEN MALULASA (Puffer)
Arothron nigropunctatus



BUTETEN TITUKA'(Porcupinefish)
Diodon hystrix

All or part of boxfishes and sharpnose puffers may be POISONOUS

DÅNGLON (Boxfish)
Ostracion meleagris

BUTETEN PENTO (Sharpnose puffer)
Canthigaster solandri

POISONOUS REEF FISHES (Tetrodotoxic)

Several kinds of reef fishes are poisonous to eat. Buteti (puffers) and buteten tìtuka'(porcupine fishes) produce an extremely toxic substance called tetrodotoxin. Dånglon and toriyu(boxfishes) and tripletooth puffers might also produce this poison, but more research needs to be done. Tetrodotoxin is usually concentrated in the internal organs and skin, but the flesh may also be toxic. The toxin is one of the most powerful poisons known and a very small amount can cause death. Some people eat the flesh of puffers, but that is a very dangerous practice. The toxin cannot be destroyed by cooking or any other process. The toxin causes the skin of these fishes to taste bitter so predators will avoid them. Puffers also can make themselves larger and harder than normal by inflating themselves with water. This also makes it harder for a predator to eat them. An inflated spiny puffer is nearly impossible to eat. Boxfishes also produce a substance that makes them taste bad. This poison is released from the skin when the boxfish becomes frightened or stressed and can kill other fishes in the same bucket or aquarium as the boxfish. It is not yet known whether the poison from boxfishes is the same as tetrodotoxin.

Puffers, porcupinefishes, and boxfishes eat a variety of plants and bottom-dwelling animals like mollusks, crustaceans, sea urchins, starfishes, and worms. Some have broad diets while others specialize on certain things. Some puffers for example, feed mainly on tips of branching corals. Most of these fishes are slow swimmers since they have little to fear.

Photos © Robert F. Myers

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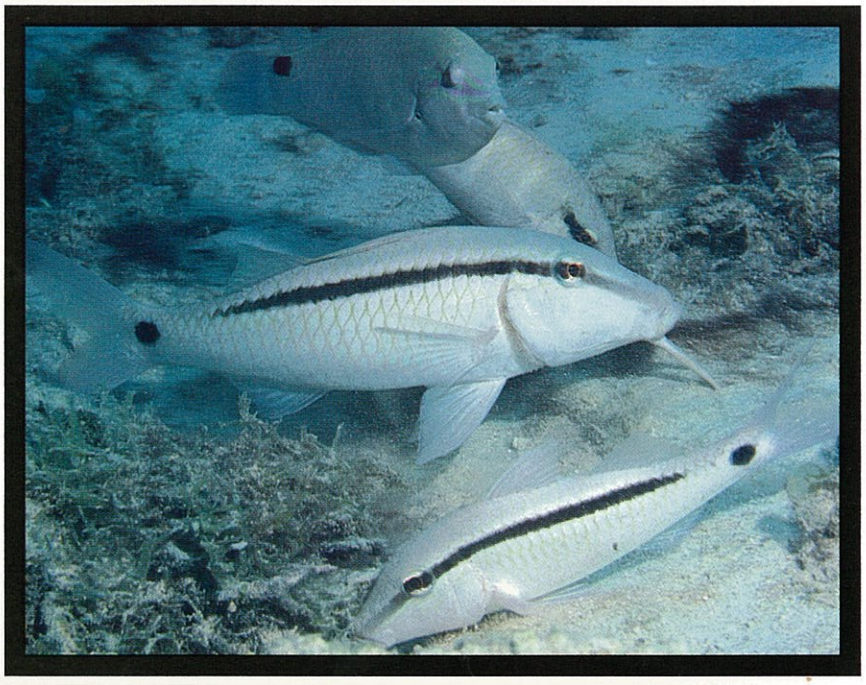

SATMONETEN PENTO
(Yellowstripe goatfish)
Mulloidichthys flavolineatus

SATMONETI (Dash-and-dot goatfish)
Parupeneus barberinus

SATMONETI (Goatfishes)

Satmoneti are elongated bottom dwellers that have a pair of long barbels or whiskers (called båtbas in Chamoru) under the chin. They use the barbels to probe the bottom for the small animals that they eat. Most kinds of goatfishes feed on crabs, shrimps and other sand-dwelling animals, but a few feed primarily on fishes. Most of Guam's 13 kinds of goatfishes hunt over sandy bottoms, but a few are found over hard rock or coral bottoms.

Satmoneti are excellent to eat and are caught by a variety of methods. Young goatfishes, called ti'ao, are caught by talåya (cast net), lågua' (scoop net) and chenchulu (drag net). Larger goatfishes, called satmonetiyos or satmoneti if over eight inches (20 cm), are caught by tekken (gill net), tokcha' (spear) and etupak (hook and line).

Young goatfishes swim to the reef from the open sea as silvery post-larvae when they are about two to three inches long. Within a few days they change to their adult color pattern and start feeding on the bottom. For their first several days on the reef, they are known as ti'ao. The yellowstripe goatfish, the most common kind of ti'ao, arrives on the reef flats in large groups. Both adult and young yellowstripe goatfish are the most common kind of goatfish in shallow reef flat and lagoon waters. During the day they most often occur in large groups. Adults may be seen hovering in deeper parts of the reef flats near the shelter of corals. They disperse over the sand at night to feed and change their color to a blotched pattern with an elongate dark spot on their sides. A few individuals also feed during the day and are uniformly light with the elongate spot on the sides. The dash-and-dot goatfish is the largest kind and grows to about 24 inches (60 cm).

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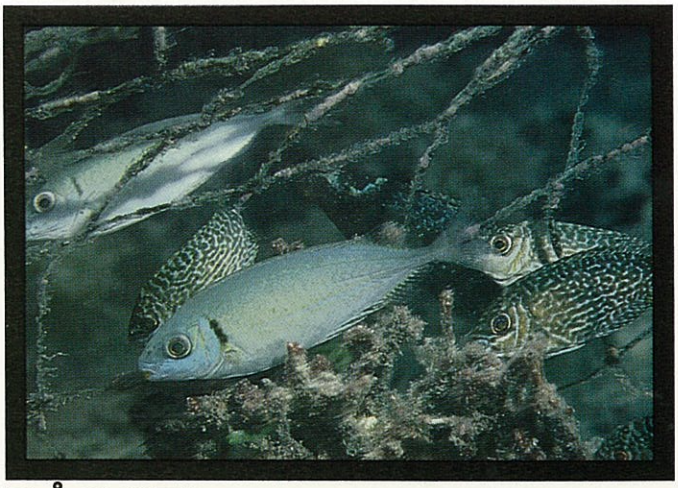
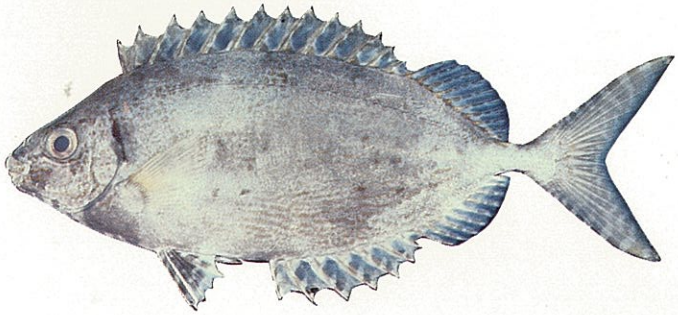
SESYON/HITENG
(Rabbitfishes)



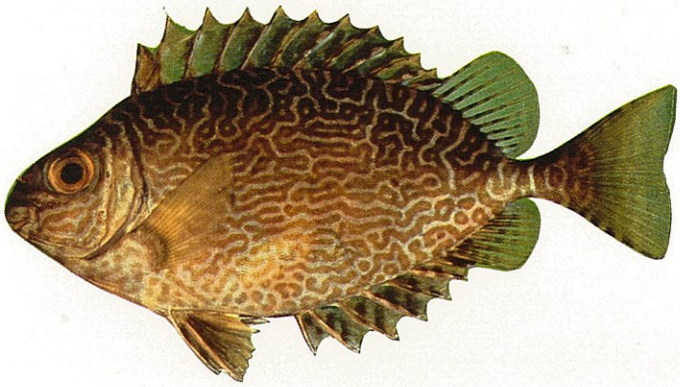
DÅGGE' (Forktail rabbitfish and scribbled rabbitfish)

Siganus argenteus and *S. spinus*



HITENG (Forktail rabbitfish)

Siganus argenteus



SESYON (Scribbled rabbitfish)

Siganus spinus

Rabbitfishes are important food fishes. They have well-developed, venomous fin spines along the back and underside. Their venom can cause an extremely painful sting.

There are five kinds of rabbitfishes on Guam. The three not shown are relatively uncommon deep-bodied kinds that occur in small groups or pairs below the edge of the reef flat.

The two most abundant kinds, *Siganus argenteus* and *Siganus spinus,* are each subject to two major fisheries.

The first occurs when they arrive from the open sea as tiny silvery, transparent post-larvae called "manåhak" in Chamoru. This usually happens during a few days around the time of the moon's last quarter in April or May and occasionally in October.

The harvesting of manåhak is seasonal and has been a long-standing cultural tradition with Chamorus. With the increase in jet ski and other motorized craft activity in East Agana Bay where fishermen usually await the runs, an Executive Order was issued by the Governor of Guam in 1991 which provided for the closure of the bay during the peak of the manåhak season. Athough manåhak are caught throughout the island, East Agana Bay is considered the traditional site for manåhak to arrive.

Manåhac arrive in large tightly-packed schools containing thousands of individuals. Fishermen scoop them up in fine-mesh nets. A highly-prized delicacy, manåhak is eaten fried or pickled in salt and lemon juice and served as a condiment. Within a few days of reaching the reef, manåhak begin to feed on algae and adopt their color pattern. At this stage they are known as dågge'. Their taste changes and they are not considered very good to eat for several months until they reach adult size (hiteng and sesyon). Adults are caught primarily by nets and spears, but some are caught by hook and line using "chaiguan," a green stringy algae, as bait.

Hiteng usually occur in large schools that roam the reef feeding on algae scraped from the bottom. They tend to live in deeper lagoon areas or the outer slope beyond the reef edge. Sesyon sometimes occur in large schools but usually are found in small groups and live primarily on reef flats and in shallow lagoons. Hiteng reach a size of 14 inches (36 cm) and sesyon reach a size of about 11 inches (28 cm).

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Photo © Robert F. Myers

TANGISON (Humphead Wrasse)

Cheilinus undulatus

The tangison is the largest of all the wrasses and the second largest of the reef fishes. It may reach a length of eight feet and weight of 420 pounds (191 kg). The largest on Guam are probably about 200 pounds (90 kg). Adults develop a prominent hump on the forehead and have thick spongy lips. Small tangison may be distinguished from similar green wrasses by a unique pattern of three black lines extending from the eye. These are called tasen guaguan in Chamoru.

Small tangison live in coral-rich areas of shallow lagoon reefs. By the time they reach a foot in length, they move off the reef flats into deeper water. Adults occur along reef slopes at depths of six to 200 feet (2 to 60 m). They have a "home" cave or hole within which they sleep or hide when pursued.

In some areas, several young tangison may be seen on a single visit, but adults are not often seen and individuals over 100 pounds (45 kg) are rare. They are quite wary and move away as soon as they sense that they are being watched. The tangison is usually solitary. It feeds primarily on mollusks and other hard-shelled invertebrates including crustaceans, sea urchins, brittlestars, starfish, and sometimes fishes. It is one of the few predators that is able to eat toxic animals such as the crown-of-thorns starfish, boxfishes, and sea hares. The thick, spongy lips appear to absorb sea urchin spines, and molar-like teeth in the throat called pharyngeal teeth crush the shells of animals such as trochus shells (alileng tulompo/alileng pulan).

In some places, large tangison may contain ciguatera toxin in their flesh and may be poisonous. Although this does not seem to be a problem with tangison on Guam, it would not be wise to eat tangison weighing over 100 pounds (45 kg).

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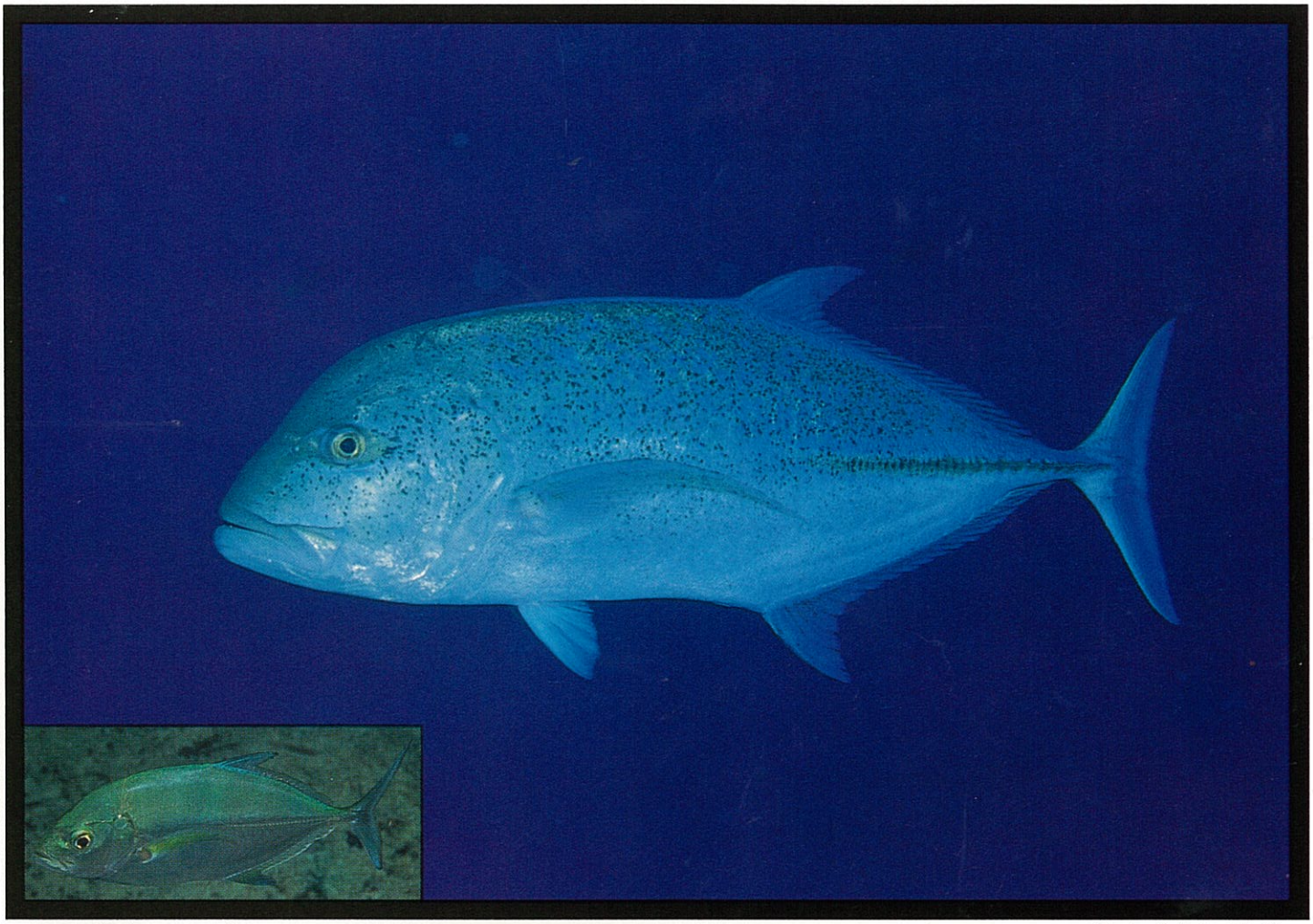

Inset: I'e' (Juvenile)

Photos © Robert F. Myers

TARAKITU (Bluefin trevally) *Caranx melampygus*

The bluefin trevally is Guam's most common reef dwelling jack. Jacks are fast-swimming silvery fishes that roam the open waters above the reef or the upper levels of the open sea. Jacks have a lateral series of bony scutes that form a reinforcing keel at the base of the tail. Some jacks look like tunas, but tunas lack scutes. There are many kinds of jacks in Guam's waters. They include the trevallies, pompanos, amberjacks, round scads, rainbow runner, and bigeye scad (atulai). Trevallies are large, laterally compressed jacks that feed on fishes or crustaceans such as crabs and lobsters.

Jacks of all sizes and species are popular food fishes. Young trevallies about three inches in length, called i'e', migrate from the open sea to shallow shoreline waters during the summer months. They feed on small invertebrates and fishes and are easily caught with light tackle using a piece of rubber band as a lure. Immature trevallies of four to 10 inches (10 to 25 cm) in length are called "tarakitiyu" and those larger than 10 inches are called "tarakitu." The bluefin trevally reaches a length of about 30 inches (76 cm). Another kind, the giant trevally (*Caranx ignobilis*), gets much larger, sometimes up to four and a half feet (1.4 m) long and 150 pounds (68 kg). When over three feet (0.9 m), it is called "mamulan." Other kinds of jacks at Guam include the"tarakiton amariyu" or golden trevally (*Gnathanodon speciosus*), which is found in deep lagoons and outer reefs; the "tarakiton åttelong" or black jack (*Caranx lugubris*), found off steep dropoffs and offshore banks, and the "tarakiton tailas" or bigeye trevally (*Caranx sexfasciatus*), frequently caught when night-light fishing for atulai.

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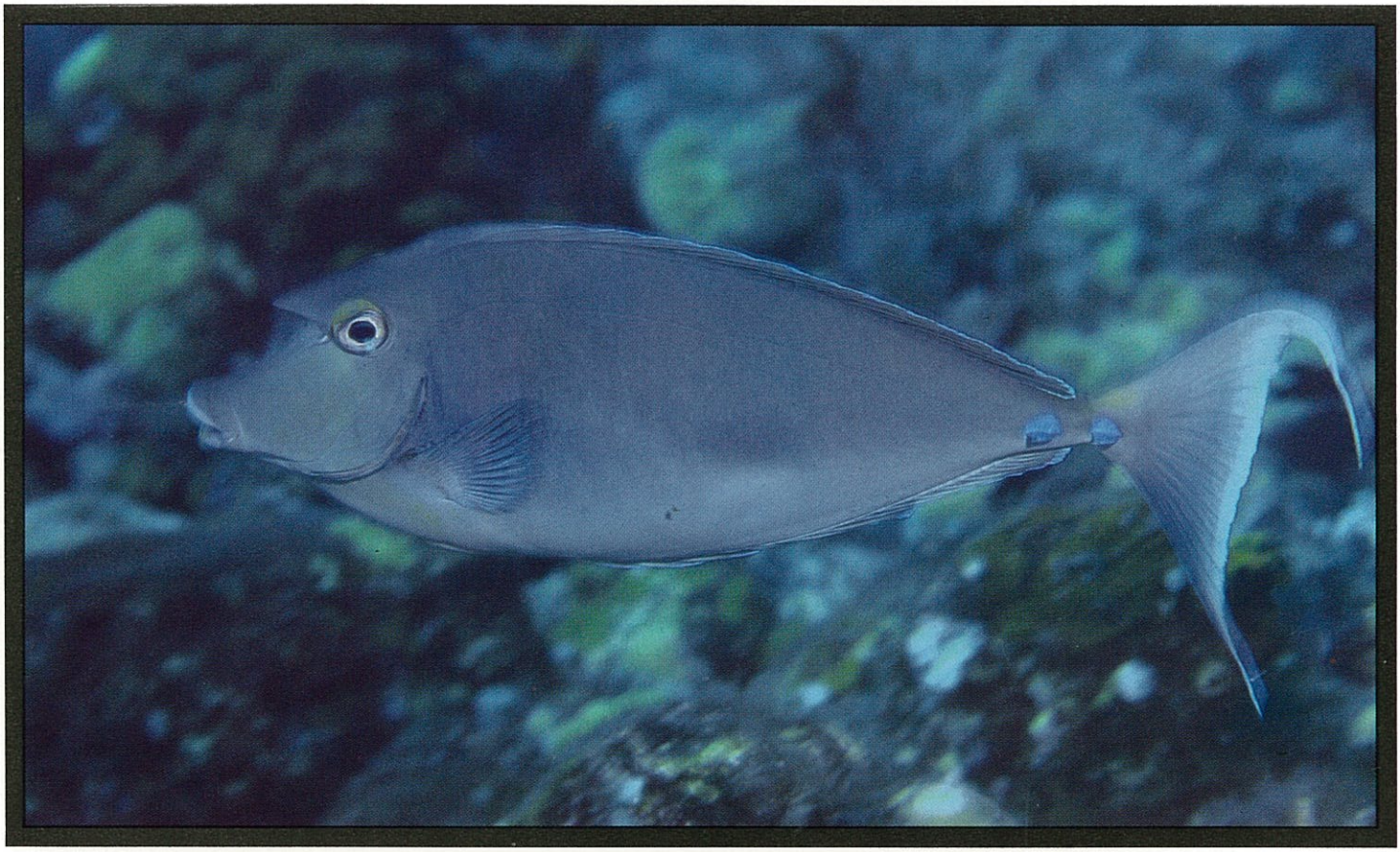

Photo © Robert F. Myers

TATAGA'
(Bluespine Unicornfish) *Naso unicornis*

The tataga' is one of a group of unicornfishes that develops a prominent horn on the forehead. Most unicornfishes have two pairs of sharp bladelike spines at the base of the tail. These are used for defense and can easily cut the hand of a careless fisherman. The blue color around the base of the spines is a warning signal to would-be predators that this fish may be dangerous to capture and eat. Tataga' are popular foodfish.

Tataga' are the most common unicornfish of shallow reef slopes where they may occur in groups. They are most abundant in surgy outer reef areas, but also occur along lagoon and channel slopes to a depth of about 100 feet (30 m). They feed on attached and floating seaweed and are particularly fond of leafy brown *Sargassum* seaweed, called chaiguan in Chamoru. A skilled fisherman can hook them in channels by using chaiguan as bait. Tataga' are also caught by spearfishing and by cast net along the reef margin. Tataga' may reach a length of 22 inches (46 cm), excluding the tail filaments.

Young tataga', called guassa' in Chamoru, do not have a horn and settle from the reef as nearly transparent larvae after having lived in the surface waters of the open sea for up to two months. Unicornfish larvae get unusually large, up to two inches (5 cm), before they settle on the reef. That is why it is impossible to find smaller young on the reef. Large tataga' larvae have distinctive dark spots on the back and are a common prey of måhimåhi, wahoo, tunas, and young billfishes.

Three other horned unicornfishes occur at Guam, none of which have blue spines. The whitemargin unicornfish (*N. annulatus*) has a white margin around the tail and when small, has a white ring around the tail base; the spotted unicornfish (*N. brevirostris*) has dark spots and vertically-elongated streaks on the body and a white tail; and, the humpnose unicornfish (*N. brachycentron*) called tataga' halu'u in Chamoru, has a bizarre-looking hump on the back.

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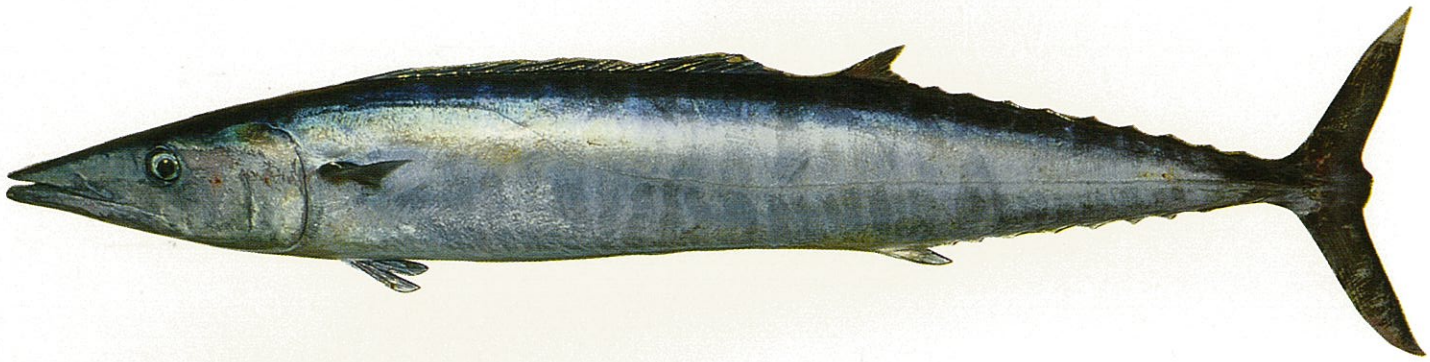

TOSON (Wahoo)

Acanthocybium solandri

The wahoo, or toson as it is called in Chamoru, is a member of the same family as tunas. It occurs in all tropical and warm-temperate seas where the water is 71°F (21°C) or warmer. They are among the fastest fishes known, able to reach speeds as high as 47 miles per hour (76 kph). They feed primarily on fishes and to a lesser extent, on squids and crustaceans. In coastal waters they feed largely on post-larval reef fishes and baitfish as well as on flying fishes and small tunas.

Tosun have extremely sharp close-set teeth that form a saw-like cutting edge. Their prey are frequently cleanly cut into two or three pieces. Their snapping jaws can be quite dangerous to the careless fisherman. Tosun are often found above deep drop-offs between the 140 to 660 foot (43 to 200 m) depth contours.

In the Atlantic and probably also on Guam, tosun spawn in the spring and summer. Little is known of their growth rates or migratory patterns. They reach a fork length of six feet 11 inches (2.1 m; measured from the tip of the snout to the notch in the middle of the tail) and weight of 150 pounds (68 kg). However, the largest ones caught near Guam are about 70 pounds (32 kg).

Tosun are not abundant enough in open ocean waters to form the basis of a major fishery, but are important in the small boat subsistence or sport fisheries of many countries. They are caught primarily by trolling with lures or squid. Highest catches on Guam usually occur in November when large numbers of small fish migrate through our ocean area. Catches throughout the rest of the year are variable with recent annual landings ranging from 16 to 80 tons (15-73 MT).

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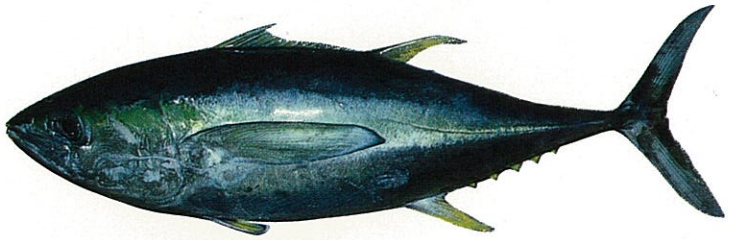
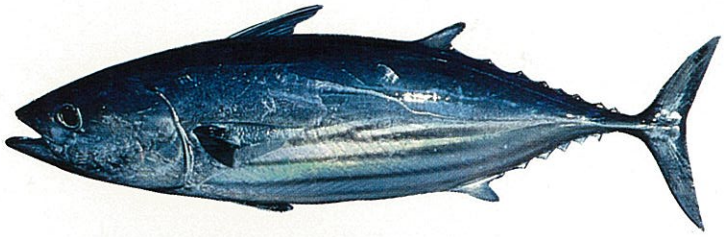
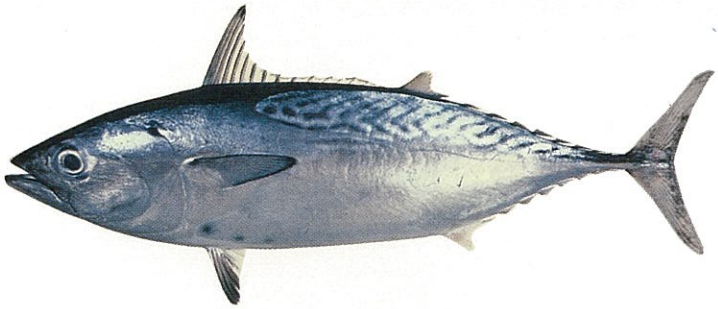
TUNAS



YELLOWFIN TUNA *Thunnus albacares*



BUNITA (Skipjack tuna) *Katsuwonus pelamis*



KAWAKAWA *Euthynnus affinis*

Tunas are the most important food fishes of tropical seas. The skipjack tuna is the world's most important fishery species with annual catches reaching six million tons.

Eight kinds of tuna have been reported from Guam. Skipjack tuna is the most abundant, followed by yellowfin tuna, and kawakawa, all of which are caught by trolling. Dogtooth tuna live near reefs and are caught primarily by bottom fishing. Frigate tuna and double-lined mackerels are rare visitors, and albacore and bigeye tuna stay in deep offshore waters.

Guam is the home base for a large fleet of purse-seiners and the world's largest fleet of longliners. These vessels fish primarily south of Guam in the Federated States of Micronesia. The purse seiners target skipjack and yellowfin tuna and can scoop several tons in a single set. Most of their catch is transhipped to foreign canneries. The longliners target large yellowfin and bigeye tuna from water as deep as 825 feet (251 m). Most of their catch is air-flown to Japan for the fresh-fish sashimi market.

Most tunas are highly migratory, high-seas fishes that feed on a variety of smaller fishes, squids, and crustaceans. They grow rapidly and live for only a few years. Most tunas are "warm-blooded." As they increase in size, their core body temperature gets progressively higher than the temperature of the surrounding water. To avoid overheating, they must move to cooler waters as they grow, either by migrating to subtropical or temperate regions, or by remaining in deep water if they stay in the tropics. For this reason, large tunas of most species cannot be caught by trolling in surface waters near Guam.

Skipjack tuna is the most abundant and easily-caught fish by trolling. Recent Guam annual landings have ranged from 37 to 124 tons (34 to 112 MT). However, skipjack tuna have a low market value so many fishermen try to catch other species instead. Therefore, in some years, the catch of skipjack tuna is exceeded by that of mahimahi or wahoo. Skipjack tuna reach a weight of 42 pounds (19 kg), but the largest from Guam are about 20 pounds (9 kg).

Yellowfin tuna is highly prized for the local sashimi market. However, it is not as abundant as skipjack tuna; recent annual landings by trolling are almost always lower, ranging from 17 to 68 tons (16 to 62 MT). Catch rates and the abundance of 50 to 150 pound (23 to 68 kg) fish seem to be declining. This may be an indication of overfishing by purse-seiners and longliners.

Yellowfin tuna reach a weight of 388 pounds (176 kg), but the largest caught by local trollers are about 160 pounds (73 kg).

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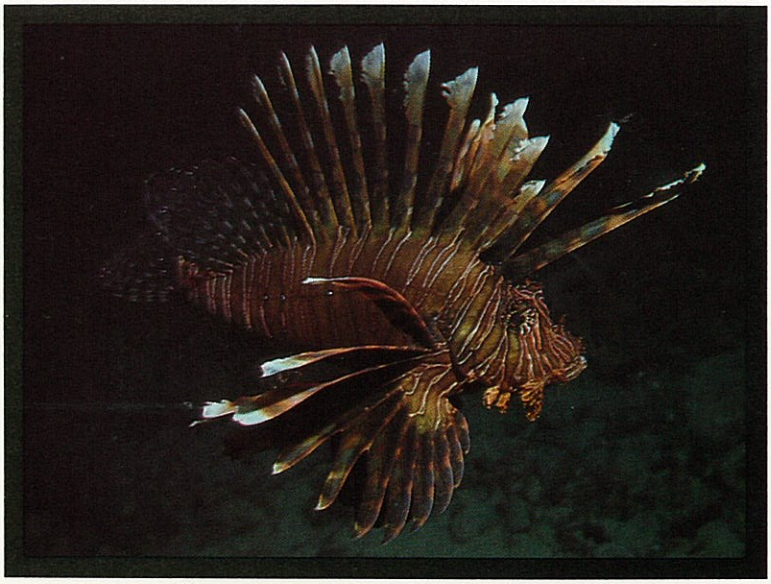
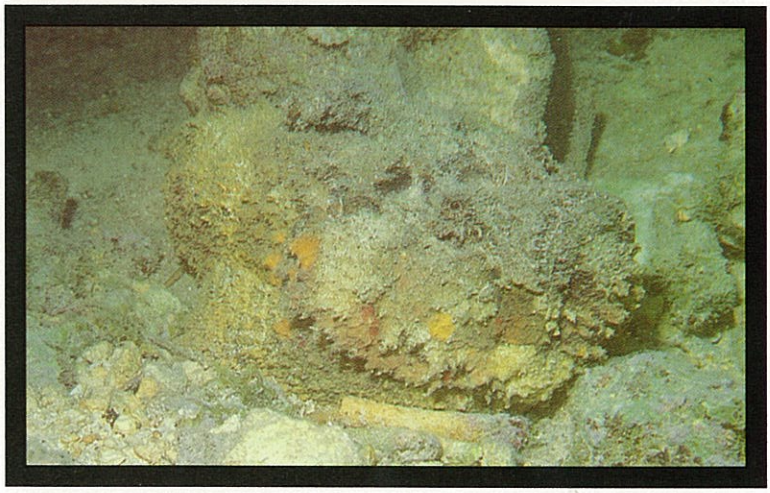
VENOMOUS FISHES



NUFO′ PÅBU (Lionfish) *Pterois volitans*

NUFO′ (Scorpionfish)

Parascorpaena mossambica



NUFO′ (Stonefish) *Synanceia verrucosa*

There are two families of fishes inhabiting Guam's shallow reef waters that have venomous fin spines. They are the scorpionfishes and rabbitfishes (see Sesyon/Hiteng).

Lionfishes and the stonefish are members of the scorpionfish family. All scorpionfishes have venomous spines. These spines are located in the fins on the back and underside. Punctures from the spines can cause extreme pain, swelling, and in rare cases, even death. There are 25 kinds of scorpionfishes in Guam's waters. They have large mouths and and feed on small fishes, crabs, and shrimps. Most scorpionfishes are well camouflaged and very difficult to see. They generally live on the bottom in rocky or weedy areas. However, the lionfishes may be quite colorful and conspicuous and often swim in the open.

There are five kinds of lionfishes at Guam. The largest of them, *Pterois volitans*, reaches a length of 13 inches (33 cm). Lionfishes live in shallow reef waters from the low tide line to over 200 feet (60 m) deep. They are slow moving and will stand their ground when harassed, pointing their venomous spines at their foe. They make spectacular aquarium pets and when properly cared for, can become quite tame and grow rapidly. But they are potentially dangerous and should be kept in a place innaccessible to children.

The stonefish may be the world's most venomous fish and has caused many human deaths. Its spines are easily able to penetrate a tennis shoe. Most wounds from the stonefish are not fatal but cause extreme pain and swelling which may result in death of surrounding tissue or amputation of fingers or toes. Fortunately, stonefish prefer to rest against rocks or under ledges where they are not likely to be stepped on. The stonefish reaches a length of 13 inches (33 cm) and is the largest kind of scorpionfish on Guam's reefs.

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DAWR photo

ÅGA (Mariana Crow) *Corvus kubaryi*

Endangered Species **Endemic to Guam and Rota**

The åga, or Mariana Crow, once occurred in most of Guam. Now, only small numbers survive in forests at the northern end of the island.

At one time, farmers used to shoot the åga because it raided corn fields and ate baby chickens. Now there are too few of them to do any damage to farms. Predation by the brown tree snake is responsible for the decline of this species.

Åga sometimes fly in groups for long distances. Some people here believe that if you hear its call, someone is about to become ill. These birds closely guard their territories and will chase and scold you or other birds with a loud "råh" squawk. Åga are social birds and groom each other, by pecking insects off of each other. They are omnivorous, which means they eat both plants and animals, including insects, lizards, flowers and berries. They use their beaks to hammer small chunks of bark from trees to expose and eat the insects.

Åga often nest high in the tops of *Elaeocarpus* or "yogga' " trees, where they build heavy nests from branches. Both parents build the nest and sit on the eggs. Young åga follow their parents, watching them closely and copying what they do. When they are hungry, they squawk and beg to be fed.

The åga is a special bird that lives only on Guam and Rota, and nowhere else. It is listed on both the federal and local endangered species lists. In 1992, a pair of crows successfully hatched its eggs in a tree that had been snake-proofed by the Division of Aquatic and Wildlife Resources (DAWR). The DAWR will continue to snake-proof other yogga' trees to allow crows to nest and raise their young without the risk of snake predation. About 50 crows remain on Guam with another 600 to 1,000 crows on Rota.

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DAWR photo by Paul Conry

KARABAO (Water Buffalo)

Bubalus bubalis

Introduced Species **Protected Species**

Karabao, as water buffalo are called locally, were brought to Guam from the Philippines in the late 1600s. Because of their great strength, they were used by farmers to pull plows and carts and have been called "living tractors". In recent years, however, they have been replaced by machine tractors. At one time there were several thousand karabao on Guam, but now fewer than a hundred may remain on farms. A wild population of about 300 animals also lives in the savanna and forests of southern Guam. Karabao are protected on Guam which means that it is against the law to hunt, kill or in any way harm these animals.

Closely related to the African cape buffalo, karabao have the general appearance of domestic cattle. Adults weigh 1,500 to 1,800 pounds and have fairly long gray or black hair thinly covering their huge bodies. They have a tuft of hair on their forehead and at the tip of their tail. Normally they are silent, but they will give a trembling snort if they are surprised. Both males and females have massive horns. Since karabao have no sweat glands, they cool themselves by lying in water holes or mud during the heat of the day. Mud caked onto their bodies also protects them from bothersome insects.

Karabao eat grass and other vegetation, feeding mainly in the cool of the mornings and evenings. In areas where they form large herds, their wallowing and well-worn trails can cause considerable vegetation damage and soil erosion. In some places of the world, karabao are used for milk, just like a cow, or they may be eaten. They live to be about 18 years old and have one calf each year.

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1994

DAWR photo by Chris Wille

BINÅDU (Philippine Deer) *Cervus mariannus*

Introduced Species **Regulated Game Species**

Philippine deer or binadu in Chamoru, were brought to Guam by the Spanish about 200 years ago. Originally from the Philippines, this species of deer adapted well to the environment on Guam and eventually spread all over the island.

Male deer are called bucks or toru in Chamoru. They average about 125 pounds, but the largest ones can weigh as much as 300 pounds. Female deer or does, known as båka in Chamoru, are smaller and average about 80 pounds. The bucks grow pointed antlers that are used to fight other males and to get the attention of does. The antlers fall off at the end of the breeding season and the buck grows a new, larger set the following year. Does very rarely have antlers; those that do are called "spiked does". Does have one fawn or baby each year.

Binadu are mostly found in the forest where they eat a variety of bushes and grass. Does make a deep-throated barking sound, while bucks and fawns have a squeaky whining call. This animal is shy and sometimes easier to hear than see in the forest. Deer "sign", such as droppings (called pellets) and hoofprints, is more easily found.

Binadu are protected by law and may be hunted only by licensed hunters during the legal hunting season. Anyone 13 years or older is eligible for a hunting license, which can be purchased from the Department of Agriculture's Division of Aquatic and Wildlife Resources in Mangilao or at any authorized vendor. Deer hunting season runs from October through December and all of September the following year. Legal hunting hours are one-half hour before sunrise to one-half hour after sunset. Licensed hunters are allowed to take one antlered deer each season.

People who hunt deer all year long using spotlights at night are known as "poachers." This is against the law and bad for the deer population. It also deprives legal hunters and those who enjoy watching deer of their legitimate recreation. Deer are generally less common in the central and southern areas of the island, but are more plentiful in northern forests, especially in areas where they are protected from poaching.

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1994

KULEPBLA (Brown Tree Snake)

Boiga irregularis

Photo © Robert F. Myers

Introduced Species

The kulepbla, as the brown tree snake is called in Chamoru, is an introduced species that probably arrived on Guam hidden in ship cargo.

It is often mistakenly called the Philippine rat snake, however, scientists have determined that this reptile is the brown tree snake and does not even occur in the Philippines. It is native to Papua New Guinea, the Solomon Islands and northern Australia.

The kulepbla deposits up to 12 leathery shelled eggs in caves, hollow trees, or other places where they are protected from drying out and overheating. The eggs hatch after an incubation period of about 90 days. The young kulepbla are about 15 inches (38 cm) long when they hatch, but may reach lengths of three feet (90 cm) in about a year. They are about four to five feet (1.2 to 1.5 m) long when they first reproduce and can grow to as long as 10 feet (3 m).

The kulepbla is one of only two snakes found on Guam. The other is the blind snake or ulo' attelong, as it is called in Chamoru. The kulepbla lives mainly in trees and is nocturnal which means it is most active at night. It is sometimes found in or around homes, commercial buildings and other urban areas in search of food and hiding spots.

These snakes feed on birds, eggs, lizards, rats, mice and other small mammals. They are the cause of the decline of Guam's native forest bird population. They also prey on baby Mariana fruit bats, thus contributing to the overall decline of the bat population. Like most reptiles, the kulepbla can go for long periods without food.

Kulepbla are poisonous. Several babies on Guam have nearly died after being bitten by it. This is why parents are advised to keep kulepbla away from infants and small children. Kulepbla are also constrictors which means they kill their prey by wrapping themselves around their prey and then squeezing. They also kill their prey by holding on to it and chewing, thus allowing the poison to slowly leak into the victim. These snakes will strike and bite if cornered, but people generally have little reason to fear them.

Because the kulepbla is introduced or is not native to Guam, it has no legitimate place on our island. Thus, the Division of Aquatic and Wildlife Resources encourages the public to destroy all kulepbla or take them live and turn them in to the DAWR for scientific study. Research is ongoing to develop a method to control or eradicate the kulepbla on Guam.

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1994

Photo by U.S. Fish and Wildlife Service

NGÅNGA′ (Mariana Mallard)

Anas oustaleti

Endangered Species

Endemic to the Marianas

Extinct

Photo by Robert E. Mumford

GA′KARISU (Nightingale Reed-Warbler)

Acrocephalus luscinia

Endangered Species

Endemic to the Marianas

Both of these birds were once residents of Guam's wetlands. The Mariana Mallard, or "ngånga' " as it was known locally, was the only wild duck to nest in the Marianas. It also lived on Tinian and Saipan, but nowhere else. It became extinct because of overhunting and the loss of freshwater marshes. The last sighting on Guam was in 1967 near the U. S. Naval Station. The last birds on Saipan were seen in 1979, when three were caught for a captive breeding program. Unfortunately, the birds did not reproduce.

Ngånga' usually lived in pairs or small groups, although flocks of 50 were occasionally seen. The birds ate plants, seeds and insects.

The Nightingale Reed-Warbler once lived in the Agana Swamp, Atantåno River marsh, and other freshwater wetlands with thick reedbeds. Its Chamoru name "ga'karisu" means "dweller among the reeds". The birds were often shy and difficult to see. Their yellow-brown color helped them to hide among the dry cane stalks.

The ga'karisu was known for its beautiful and loud song, which was composed of trills, warbles, and whistles. The birds would sing for up to several minutes at a time, often from an exposed perch on top of a tall reed stalk. Most singing was performed by the males as they defended their territories. These birds caught insects with long curved bills.

Ga'karisu were last seen on Guam in the late 1960s. Biologists believe that wetland fires, predation by the brown tree snake, and pesticides may have caused their extinction. Fortunately, the species still lives on Saipan, Alamagan, and Aguijan in the Northern Marianas. On these islands, ga'karisu live in upland thickets of grass, tångantångan, and forest.

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1994

NOSSA′ (Bridled White-Eye)

Zosterops conspicillatus conspicillatus

Endangered Species **Subspecies endemic to Guam**

Extinct on Guam

These tiny yellow-green birds, known in Chamoru as "nossa' ", were once very common throughout Guam. Nossa' got their name from the white ring around their eyes. The Guam subspecies was found only on Guam and nowhere else in the world. They were last seen in 1983 and are now extinct. Predation by the introduced brown tree snake was responsible for this bird's extinction. Other subspecies of the nossa' still occur on Rota, Tinian, and Saipan.

Nossa' were hard birds to see. They were very active, darting quickly from tree limb to tree limb. Their colors helped them blend in with Guam's lush green forest. Often flying in small flocks, nossa' stayed high up in trees and ate mainly insects, berries and other small fruits.

The nest was shaped like a hanging basket and made mostly of grass held together with spider webs. The inner cup was lined with hair or small roots.

Female nossa' laid two to four blue eggs. Both parents sat on the eggs and helped care for the babies. Young nossa' were able to fly as soon as twelve days after hatching.

Painting courtesy of H. D. Pratt

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1994

DAWR photo by Anne Maben

PALUMAN APÅKA'/PALUMAN FACHE'
(White-Throated Ground-Dove)

Gallicolumba xanthonura

Endangered Species **Native Species**

Extinct on Guam

The White-throated Ground-Dove could once be recognized by its low moaning cry, which was heard early in the morning or late afternoon.

The male dove, or "paluman apåka' ", which means white bird in Chamoru, had a chocolate brown body and wings. It got its name from its white head and breast. Female doves had shades of brown with no white. Males and female doves looked so different that Chamorus called the female "paluman fache' ". Fache' is the Chamoru word for mud or muddy.

The males were aggressive and would fight another male by attacking its head and neck. Sometimes they fell through the trees as they fought. After they had regained their dignity, the males pranced about flapping their wings and puffing out their chests. They would fight until one male won a waiting female. Paluman apåka' and paluman fache' ate small berries, fruit, seeds and flowers while perched in the branches of trees. A male and female built their nest high in a tall tree and both helped incubate the eggs. Young ground-doves were fed "pigeon's milk" until they were almost as large as their parents.

Once common in Guam's limestone forests, the last dove sighting was in 1987. Predation by brown tree snakes was the main cause of their extinction on Guam. Because ground-doves still remain in the Northern Marianas, it may be possible to reintroduce them back into the wild on Guam if brown tree snakes can be controlled or eradicated.

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1994

Photo by Robert E. Mumford

PALUMAN SINISA
(Philippine Turtle-Dove) *Streptopelia bitorquata*

Introduced Species

The Philippine Turtle-Dove was brought to Guam by the Spanish in the 1770s. Originally from the Philippines, this bird adapted well to Guam's environment and spread all over the island.

A member of the pigeon family, the "paluman sinisa", as it is called in Chamoru, eats seeds and small fruit which it stores in a sack in its throat called a crop. The food is digested at a later time.

This bird nests year-round on Guam. It makes a weak nest of twigs in small trees and shrubs. Two eggs are usually laid, which the adults take turn sitting on and incubating for 17 days. Once the baby doves hatch, they are fed "pigeon's milk", a white liquid made in the lining of the crop, for one to two weeks. At this age, the chicks have to stick their beaks into their parent's mouth to eat this food. As they get older, their diet is shifted to seeds and fruit. They remain in the nest for about 16 to 19 days after hatching and during this time, they grow flight feathers and learn to fly. After leaving the nest, the young usually stay nearby and continue to be fed by their parents.

Paluman sinisa were once very numerous on Guam and a hunting season was set aside for this popular game bird. Although still found throughout the island, its numbers have declined in recent years and it has since been taken off the game list. Snake predation is the cause for the bird's decline. The snake eats the eggs and young of the turtle-doves. If the snake population can be controlled, the bird will probably recover quickly and can once again be hunted.

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Photo © Robert F. Myers

PÅNG'LAO (Land Crab)

Cardisoma carnifex

Native Species

Have you ever taken a drive down southern Guam on the eve of a full moon only to have the car in front of you suddenly slam on his brakes as if it had run over something? Perhaps you may have noticed people walking along the shoulder of the highway with flashlights in hand and a gunny sack over their shoulders? If you have, chances are the driver of the car in front of you stopped to either pick up a land crab or to let the crustacean cross the street safely. The group of people with flashlights and gunny sacks were probably out gathering these crabs for a fiesta.

A favorite among partygoers, land crabs, or "pång'lao" as they are known in Chamoru, are among Guam's most common and heavily-harvested animals. The most common species, *Cardisoma carnifex* is called "pång'lao echong" or "crooked crab". It has extremely large claws, often with one larger than the other. There are at least two other, less common and smaller-clawed species known in Chamoru as "pång'lao tunas", which means "straight crab".

Land crabs are burrowers that prefer to live near rivers where they go when they are ready to shed their shells. This is called moulting. Like all crustaceans, land crabs require sea water to reproduce. The male can fertilize the female's eggs only immediately after she moults, when her new shell is still soft. The eggs are then released in sea water, usually near a river mouth.

Land crabs are indiscriminate foragers, eating primarily seeds, fruits, and seedlings as well as dead insects. They often have mud deeply imbedded in the shell. For these reasons, they should be purged. This is done by confining the crabs in a clean enclosed area and feeding them with grated coconut and water for two or three days. After purging, the crabs are scrubbed thoroughly before cooking.

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1994

Photo by Robert Schallenburger

PULATTAT (Common Moorhen)

Gallinula chloropus guami

Endangered Species **Subspecies endemic to the Marianas**

This duck-like bird, called "pulattat" in Chamoru, is really a member of the rail family. Adults are black with a red forehead and beak. They live in wetlands such as Fena Lake, Agana Swamp, and smaller wetlands in southern and central Guam. They spend part of their time swimming in water and part walking in reedy areas along the shore. Although the pulattat's feet are not webbed, their long toes have lobes on them that make it possible for them to walk across plants floating in the water.

Pulattat eat plants, insects and snails. They make a hidden nest in the reeds, complete with an escape ramp to the water for the moorhen chicks to use when danger threatens. The female lays five to six eggs. Both parents sit on the eggs. When the eggs hatch the chicks are covered with fluffy black down. They have white feathery eyebrows and a white beak. Like most ground nesters, the chicks are able to run and protect themselves from predators soon after hatching. As they grow, their feathers turn brown and their beaks turn a dirty orange-brown. Finally, as adults, their feathers are black and their beak and forehead turn red.

These interesting birds were once fairly common in Guam's wetlands. Since large areas of our wetlands have been filled for development and less taro and rice is grown than in the past, there is less habitat for the pulattat. Also found on Saipan and Tinian, the pulattat is on the federal and local endangered species lists.

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DAWR photo by Anne Maben

SALEN TAIWAN (Black Drongo)

Dicrurus macrocerus

Introduced Species

This glossy black bird with a forked tail was brought from Taiwan to Rota in the 1930s to eat insects. They flew to Guam in the late 1950s and are now found throughout the island.

Called "salen Taiwan" in Chamoru, they are aggressive birds when it comes to defending their nesting territories. They will chase other birds, fruit bats, dogs and even people. They may harm Guam's remaining native birds by driving them away from their nesting areas.

Salen Taiwan are good acrobats. They use their long forked tail to help them twist and turn quickly. Salen Taiwan hunt for food from a perch. They like to sit on telephone wires or the outer branches of a tree so they can easily spot insects and look for predators. Sometimes they perch on the backs of cattle or carabao, feeding on the insects that are stirred up when the animal moves. After swooping to catch its food, the salen Taiwan returns to its perch, holds its prey down with one foot and tears it to pieces with its beak. Stiff "whiskers" by its bill help the salen Taiwan to trap small insects. It not only eats bugs but even lizards as well.

These birds build their nests out of grass, leaves and spider webs. The nests are made on flimsy outer branches of trees where predators cannot reach them. They lay three to four cream-colored eggs. In several weeks, the naked babies have grown feathers and are ready to begin catching insects on their own.

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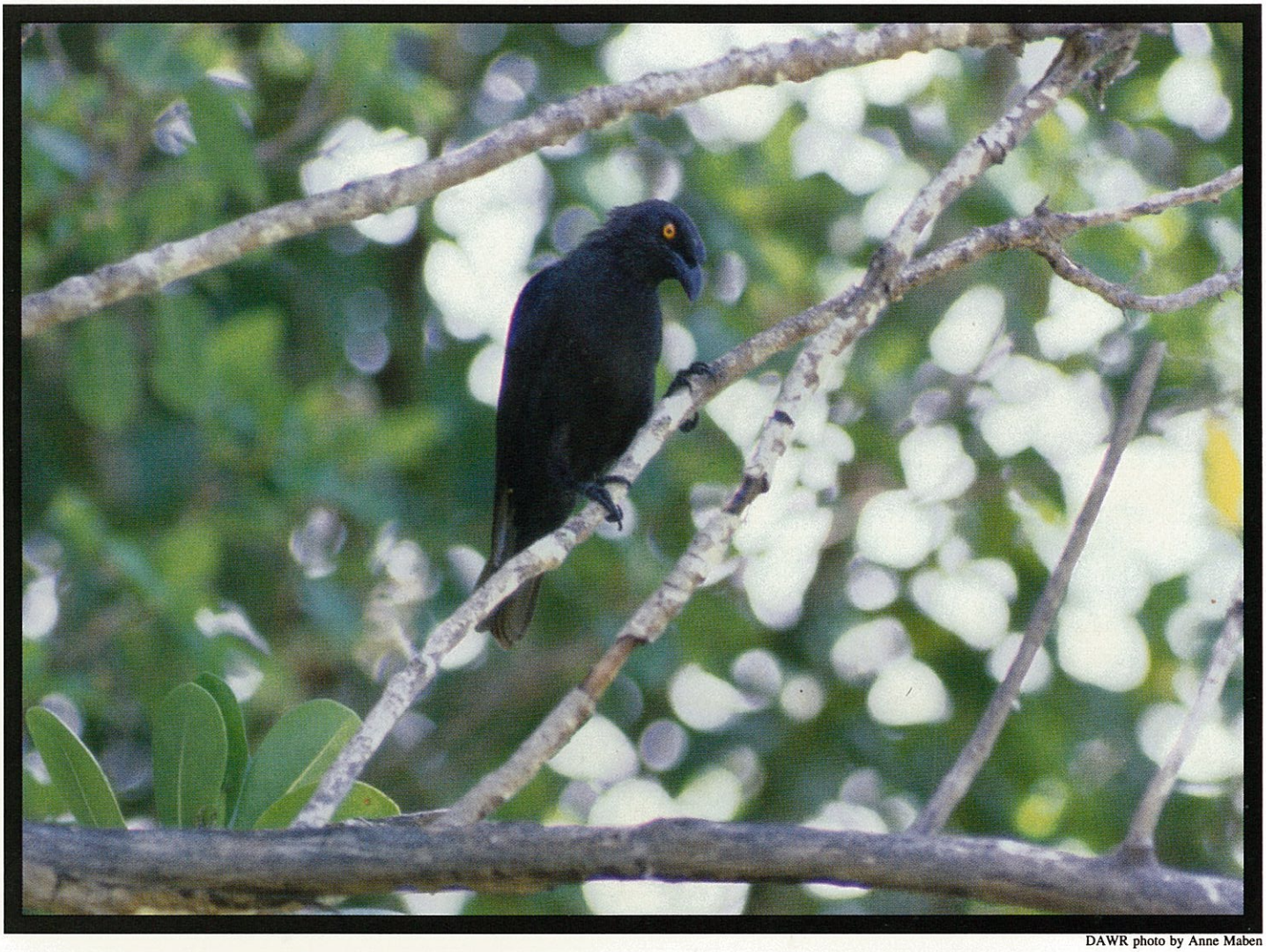

DAWR photo by Anne Maben

SÅLI (Micronesian Starling)

Aplonis opacus guami

Endangered Species **Subspecies endemic to the Marianas**

These noisy, black birds, known locally as "såli", live in groups and nest in cavities. This means they nest in hollowed out areas in coconut palms or other trees. Sometimes starlings will build their nests in holes in limestone cliffs or in wooden telephone poles.

These black birds eat fruits, seeds and insects. Females lay up to four greenish eggs and both parents sit on the eggs. Baby starlings are naked, blind and helpless when born. One parent stays with the babies while the other parent brings food to the nest. Young sali have brown eyes and gray streaks on their breasts. As they become older, their eyes turn golden and beautiful shiny black feathers start to grow.

Sali used to be found throughout Guam but predation by the kulepbla (brown tree snake) has restricted them primarily to Cocos Island, Andersen Air Force Base, parts of Agana and certain coastal areas in the south.

Our sali is different from the European starlings found in the mainland United States. Unlike their stateside counterparts, which often make pests of themselves, Guam's sali is found only in Micronesia and does not damage crops or buildings.

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1994

Above: female; **Inset:** male

DAWR photos by Anne Maben

SIHEK (Micronesian Kingfisher)

Halcyon cinnamomina cinnamomina

Endangered Species

Subspecies endemic to Guam

Extinct in the wild

The Micronesian Kingfisher, or "sihek" as it is called in Chamoru, is a colorful bird that was once very common on Guam. Predation by kulepbla (brown tree snakes) has brought about the extinction of the sihek population in the wild. The last sighting of a wild sihek was reported in 1989. A captive breeding program to save the sihek from extinction began in 1983. As of 1993, there were about 50 sihek in captivity at various zoos throughout the United States.

Kingfishers are often called "woodpeckers." They build their nests by using their bills to hammer a hole in a tree trunk. Both parents raise two babies in their nest hole. The babies are fed juicy prey like lizards, crabs and insects. The parents kill their prey by banging it against a branch. Unlike its name, these kingfishers do not hunt fish. Sihek are brave and will attack larger animals that get too close to their nest. Female sihek have a white breast while males have a tan breast.

Chamoru stories tell of a village woman who was always talking loudly and making trouble. She wore an orange kerchief and a blue dress with a white apron. An angry "taotaomo'na" (spirit of Chamoru ancestors) then turned the woman into the first sihek. Her clothing became the colors of the female sihek. Now, the unhappy bird calls loudly when people are near.

Our subspecies of sihek is found only on Guam and nowhere else. Other subspecies still remain in Palau and Pohnpei. Another species, the Collared Kingfisher (*Halcyon chloris*), occurs on many of the neighboring Mariana Islands.

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1994

TERRESTRIAL HABITATS

ALUTONG (Limestone Forest)

SESONYAN (Wetlands)

SABÅNA (Savanna)

DAWR photos by Gary J. Wiles

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Limestone Forest: This kind of native forest, called alutong in Chamoru, grows only where limestone rock is present. Most of northern Guam was once covered by limestone forest, but the only large tracts now remaining in this part of the island occur along rugged coastal clifflines and military lands. Other stands occur in parts of southern Guam. The tallest trees in this forest often reach heights of 30-50 feet tall, but are kept from growing even larger by the island's frequent typhoons. Many familiar trees commonly grow in limestone forest, such as wild breadfruit (dokdok), paipai, fågot, cycads (fadang), pengua, chopak, ifil, banyans (nunu), pandanus, yogga, and åhgao. A variety of ferns and orchids is also present. This forest is the most important habitat for coconut crabs and many of our endangered native birds and fanihi (fruit bats). Introduced deer and wild pigs feed on understory vegetation and are harmful to many plant species. Another serious threat is bulldozing to make room for development.

Wetlands: Rivers, streams, swamps, and ponds are examples of wetlands, called sesonyan in Chamoru. Wetlands hold water for extended periods of the year, are highly fertile and support a variety of animal and plant life able to exist in a saturated environment. Ito' (catfish), uhang såddok(shrimp) and asuli (freshwater eel) and the endangered Pulattat (Common Moorhen) live only in wetlands. Karisu (grass), uchaga-lane (sedge) and chå'guan saddok (pondweed) as well as woody vegetation such as pågu (hibiscus) and langasat are examples of wetland plants that may be found growing in or adjacent to wetlands. Wetlands are also important to public safety and health. Wetlands reduce the likelihood of flooding by holding rainwater runoff and by trapping eroded soils and retaining pollutants, they improve water quality.

Savanna: Grasslands, called sabåna in Chamoru, occupy large areas of red clay soil in southern Guam. Nette(swordgrass) and foxtail are the most common types of grass. Nette grows in dense inpenetrable stands that reach 8 feet tall. Other common savanna plants are various shrubs, club mosses, and ground orchids. Fires burn off large areas of grassland every year, which results in heavy soil erosion. Fires, plus the poor nutrient levels of volcanic soils, prevent forests from expanding into the savanna.

DAWR photo by Anne Maben

TOTTOT (Mariana Fruit-Dove)

Ptilinopus roseicapilla

Endangered Species

Endemic to the Marianas

Extinct on Guam

The Mariana Fruit-Dove or "tottot" as it is called in Chamoru, once graced Guam's forests with its smooth cooing call and beautiful bright colors. Brown tree snake (kulepbla) predation, however, has caused its extinction on Guam, although an occasional sighting is still reported, especially after a storm hits Rota. The tottot is still found on other Mariana Islands from Rota to Saipan.

The tottot has a purple cap, yellow and orange breast and bright yellow tail band. Its feathers are mostly green which allows them to blend into the leaves of trees as they make short flights to look for food. They eat fruits such as figs, inkberry and papåya.

The tottot lays only one egg in a flimsy nest built in the fork of a branch. Like all doves, the young are fed a milky substance produced in the lining of the parent's throat sac or "crop". The young are later fed fruit that has been partially digested.

This shy, easily disturbed bird holds special meaning for Guam because it is our Territorial Bird, the symbol of our island.

The Division of Aquatic and Wildlife Resources hopes that one day, when the kulepbla population is controlled or eradicated, we will be able to reintroduce the tottot back into Guam's forests.

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Photos © Robert F. Myers

Inset: detail of head

ULO' ÅTTELONG (Blind Snake)

Ramphotyphlops braminus

Introduced Species

Many Guam residents have probably never seen Guam's smallest snake, the blind snake, or ulo' åttelong as it is called in Chamoru. Like the kulepbla (brown tree snake), the ulo' åttelong was probably accidentally introduced to Guam by people.

Measuring up to six inches (15 cm) long, the ulo' åttelong is shy and secretive. It lives underground and is often found in rotting logs or piles of leaves. At first glance it may be mistaken for a worm. In fact, it is often called the "snake worm". Its local name, "ulo' åttelong" (ulo' means worm and åttelong means black), even suggests that it is a worm. However, take a closer look and you'll see tiny scales covering the blind snake. It also has a forked tongue. Like other snakes, the ulo' åttelong uses its tongue for smelling.

The ulo' åttelong is able to move quickly above ground and seems to almost swim through loose soil. It feeds on ants, termites, worms, and insect larvae. Eyesight is not very useful underground, but the ulo' åttelong is not really blind. It has small, weak eyes that can tell dark from light, but that's about all.

No one knows much about the life and habits of this snake. We do know, however, that it lays eggs in the soil. The eggs look like grains of rice and are left to hatch on their own.

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1994

Photo by Robert E. Mumford

UTAK/FÅKPE
(White-Tailed Tropicbird) *Phaethon lepturus*

Native Seabird

The White-tailed Tropicbird, known locally as "utak" or "fåkpe", is one of the most beautiful seabirds in the world. These white birds with black markings have sharply pointed wings and two long streaming feathers in their tails. These feathers are longer than the birds' bodies.

Tropicbirds hover over the water to catch flying fish. They dive with their wings half closed to catch other small fish and squid. They have bills with notches in them, almost like teeth, that help them hold their slippery prey. Fishermen follow these seabirds to help locate schools of måhimåhi and tuna. These birds may fly for hundreds of miles searching for food. Sometimes they'll circle a ship at sea, screaming noisily, then fly away. When they are not nesting, they sometimes spend months at sea.

Although graceful while flying, these birds with their short legs can hardly walk on land and have to crawl on their bellies to move around. Their webbed feet not only help them paddle on the water, but are also used to dig shallow nests in cliffside cracks.

During courtship, both the male and female glide and circle each other high in the air. One bird will sometimes hover over its mate, gently touching the lower bird's back with its long tail feathers. Females lay one egg. Both parents catch fish and regurgitate the food for the baby to eat. Until about 1985, a small colony of these birds nested at Two Lovers' Point on Guam. Biologists believe that predation by the brown tree snake is responsible for eliminating this colony and greatly reducing the number of tropicbirds around the island.

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1994

DAWR photo by Anne Maben

YÅYAGUAK (Island Swiftlet)

Aerodramus vanikorensis bartschi

Endangered Species

Subspecies endemic to the Marianas

Locally known as "yåyaguak", Island Swiftlets nest in limestone caves and were once commonly found throughout the island. In 1993, the yåyaguak population stood at only about 500 birds. Most of the remaining yåyaguak live in a single cave on Naval Magazine in southern Guam and feed in the Talofofo River Valley. The exact cause of the decline of this species is not known, however, predation by brown tree snakes or pesticides are possible reasons.

Yåyaguak spend long periods of each day flying while searching for tiny aerial insects to feed on. The birds swoop and dart through the sky as they chase their food. The wings of yåyaguak are long, narrow and pointed, which allows the birds to be fast fliers.

Females lay one egg several times per year in shallow nests made of moss, which are fastened to cave walls by the bird's saliva. When the babies hatch, they immediately hook their tiny toes in the nest moss, which keeps them from falling out. Adult birds find their way in and out of dark caves using echolocation. This means that the birds make clicking sounds that bounce off the walls and other objects in the cave, telling them how far away the objects are. The yåyaguak is listed on both the Guam and U.S. endangered species lists, which means that it is against local and federal law to kill, harm, capture, or harass the birds in any way.

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1994

DAWR photo by Anne Maben

BLACK FRANCOLIN

Francolinus francolinus

Introduced Species **Regulated Game Species**

The Black Francolin (no Chamoru name) was introduced to Guam from India in 1961. Francolins are a type of game bird, which means they are hunted for sport and food.

The Black Francolin has done well on Guam. They are found throughout the southern and central portions of the island and parts of the north. They live in fields with tall grass and are most common in savanna and agricultural areas of southern Guam. They eat seeds and insects, including those that damage crops.

The male is brown and black with white streaks and spots. Females have pale brown plumage which acts as camouflage and helps them to blend into their grassy habitat. The male birds stand on dirt mounds or fence posts while they call to attract a mate. A male makes a series of loud, harsh "ka-ka-ka-kaack" sounds every 15 to 20 seconds early in the morning. After the female chooses a partner from many calling males, she will lay five or six eggs in a shallow nest in the grass. The young look like brown baby domestic chicks and start finding their own food right away. Lucky viewers may see a hen francolin crossing the road followed by her brood of five or six young.

The Black Francolin is the only game bird that can be hunted on Guam. Hunting season for francolins is from January through February and again from July through August. The legal bag limit is five birds per day and there is no season limit. It is legal to use hunting dogs for this bird. The francolin is fun to hunt and delicious to eat.

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1994

Photo by H. D. Pratt

CHICHIRIKA (Rufous Fantail)

Rhipidura rufifrons uraniae

Endangered Species **Subspecies endemic to Guam**

Extinct

The Rufous Fantail, or "chichirika" as it was known in Chamoru, used to be found all over Guam. However, they became extinct in the mid-1980s due to predation by the introduced brown tree snake.

This bird got its common name from its red-brown feathers and the habit of spreading its tail like a fan. When two male chichirika met, they challenged each other by jumping from branch to branch and flashing their tails. A male chichirika would show off for a female bird the same way.

Until recently, chichirika could be heard in the deep jungle singing beautiful songs. The songs were meant not only to help keep families together but also to warn strange chichirika to stay away. They often spent most of the day pecking bugs off leaves or flying out suddenly to grab an insect in the air. Small bristles on the sides of their bills helped direct insects into their mouths.

Pairs of chichirika would build a small nest of grasses, ironwood needles and spider webs, about ten feet above the ground. They would glue the nest together with their saliva. The eggs were then cared for by both parents, who would often raise two families a year. The babies were born naked, but became fully feathered and could fly in about 15 days. Although similar chichirika are found elsewhere in the Mariana Islands, this subspecies was endemic to or found only on Guam and nowhere else in the world.

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1994

DAWR photo by Gary J. Wiles

KAKKAK (Yellow Bittern)

Ixobrychus sinensis

Native Species

The Yellow Bittern is the only native bird still commonly found on our island. Chamorus call them "kakkak" because of the noise they make. They can be found on islands throughout Micronesia, as well as in Asia. These medium-sized, pale yellow birds with black wing stripes are fairly common in Guam's southern savanna, northern forests, and even urban areas such as downtown Agana. They are excellent hunters and eat mostly geckos, snails, skinks and insects. They perch on coconut palms or on the ground and extend their head and neck to snatch passing prey.

Kakkak are not strong fliers. When in flight, their legs trail behind their bodies and their necks are folded into an S-shape. They nest in a variety of locations, such as in low shrubs on offshore islets, in trees, and among grasses at freshwater wetlands. Three or four white eggs are laid. Once the eggs hatch, both parents feed digested food to the babies.

Kakkak are masters of disguise. They use their colors to blend into the background in an attempt to hide from predators or if they sense any immediate danger from humans. It is not unusual to find kakkak nesting or perching along sidewalks, office buildings and park areas in downtown Agana. If you find young kakkak that appear to be lost, hurt or abandoned, leave them alone. They may only be waiting for their parents to return from hunting for food and are merely using their colors to protect themselves.

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KO'KO'
(Guam Rail)

Rallus owstoni

Endangered Species

Endemic to Guam

DAWR photo by Gary J. Wiles

The Guam Rail is a special bird. Locally known as the "ko'ko' ", it is endemic to Guam, which means it is found only on Guam and nowhere else in the world. This bird is dark brown with white stripes on its stomach.

A Chamoru legend tells how the ko'ko' got its stripes. One day a monitor lizard, or "hilitai", and a ko'ko' decided they looked too plain, so the ko'ko' began painting the hilitai. When it was the ko'ko's turn to be painted, the hilitai painted a few strokes then decided he was tired and left all but the ko'ko's stomach unpainted. The ko'ko' became so angry that he bit the hilitai's tongue in two. This is why, according to the legend, hilitai have forked tongues and cannot make noise.

The ko'ko' came to our island thousands of years ago. At that time it was able to fly. However, since there were no predators on Guam, it slowly lost the ability to fly. But then people arrived on the island and brought dogs, cats, rats and monitor lizards with them. Sometime after World War II, the predatory brown tree snake also found its way to our island. Since the ko'ko' is flightless and builds its shallow nest on the ground, it was easy for these predators to catch the ko'ko' and its babies.

Ko'ko' lay up to four large, freckled eggs. Young ko'ko' leave the nest when they are only one day old. Their parents then eat the egg shell. Adult ko'ko' eat insects as well as snails, skinks and geckos. They like to live in brushy areas mixed with grassland or forest. They also like to bathe in the rain. When their numbers were high, they could often be found along the roadside in tall grass early in the morning.

The ko'ko' was so common that local hunters were able to hunt and eat all the ko'ko' they wanted. Now it is against local and federal law to capture, harass or kill a ko'ko'. Due to snake predation, the ko'ko' population has become extinct in the wild.

In 1983, a captive breeding program was established to ensure that the ko'ko' does not become extinct. The captive ko'ko' population, as of early 1994, stands at over 200 birds on Guam and in various zoos throughout the continental United States. An experimental population of rails was begun in 1990 in nearby Rota where environmental conditions are similar to Guam's and there are no kulepbla (brown tree snakes). Over 50 ko'ko' were released on Rota in 1990 and 1991, but it is not known if any of the birds survived. More releases are planned for the future.

Hopefully, when Guam's kulepbla population is controlled or eradicated, the Rota population will have flourished enough so that we will be able to bring the ko'ko' back to its native habitat.

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DAWR photo by Anne Maben

CHUCHUKO′ (Pacific Reef-Heron)

Egretta sacra

Native Shorebird

The Pacific Reef-Heron or chuchuko' as it is called in Chamoru, is a large shorebird with long legs and a long bill. It comes in two color phases. Some chuchuko' are pure white, while others are completely dark gray. Both have yellowish legs and bills. These herons have broad wings and, like all herons and bitterns, tuck their necks into an S-shape when they fly.

Chuchuko' occur in many areas of the tropical Pacific. On Guam, they are commonly found in small numbers on reef flats surrounding the island.

Chuchuko' are expert fishermen. They wade in shallow water along the shore and catch mostly fish and crabs. They usually kill their prey by spearing it and eating it whole.

Chuchuko' nest from April to July in small groups on islets close to shore. They build a nest of twigs and grass in a hidden area near the ground or in trees. Females lay two to three eggs and the young are born almost naked. Both parents have to work extra hard to find fish to feed the growing babies. Once the young chuchuko' leave the nest, they must watch their parents and practice their fishing before they can fly away and live on their own.

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DAWR photo by Anne Maben

CHUGUANGGUANG
(Guam Flycatcher) *Myiagra freycineti*

Endangered Species **Species endemic to Guam**

Extinct

Like the ko'ko' (Guam Rail), the chuguangguang (Guam Flycatcher) was endemic to Guam which means it was found only on Guam and nowhere else. An insectivore, the chuguangguang ate only insects, which it caught in the air or snatched off of foliage. It had a wide bill and long whiskers, which helped it capture flying insects.

Chuguangguang were aggressive birds which chased away intruders with a loud scolding call. An adult chuguangguang would often approach a person who imitated its series of whistle-like calls. When angry, the bird would raise a crown of feathers on the top of its head.

Chuguangguang nested in small trees such as tångantångan. They used thin twigs, roots, grass and leaves held together with spider webs to build a small, tidy nest. They laid one or two cream-colored eggs which had a band of brown spots on them. Like most small birds, the female ate the shell once the babies had hatched. Both parents would bring the nestlings juicy insects. The naked young grew feathers and learned to fly in as little as 20 days. The chuguangguang nested year-round and raised as many as three families a year.

Predation by the brown tree snake is responsible for the extinction of the chuguangguang. It was last seen in 1985 in northern Guam.

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1994

Photo by Robert E. Mumford

CHUNGE′ (White Tern)

Gygis alba

Native Seabird

The White Tern, known locally as "chunge' ", is one of Guam's familiar seabirds. It can be seen hovering over the reef, diving down to eat small fish or squid. Fishermen like this bird because it often leads them to schools of tuna and måhimåhi.

Chunge' do not build a nest; instead, they lay a single egg on a bare tree branch. The female sits on the egg while the male hunts for fish. The male feeds the female until the egg hatches. The tiny fuzzy chick has big feet to grab the branch tightly. Its feathers are spotted with various shades of brown to match the branches. Both parents bring small fish in their bill to help the chick grow quickly. Chunge' keep the same mates throughout their lives.

If the chick falls to the ground, the parents will try to feed and protect it. Storms and hungry predators make life hard for the chunge'. If a person comes too close to the baby, the parents may fly down and peck him on the head.

If a chunge' gets thirsty while fishing, it can dip down and drink seawater. Seabirds' bodies are able to get rid of extra salt that would kill most other animals.

Predation by the brown tree snake has nearly eliminated the chunge' population on the main island of Guam; however, a healthy population of several hundred birds can still be found on Cocos Island.

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1994

Photo © Robert F. Myers

DUKDOK/UMANG (Land Hermit Crab)

Coenobita brevimanus

Native Species

Locally called "dukdok" when they are young or "umang" when they become adults, hermit crabs are so named because they hide in their shells like hermits whenever they are threatened. They are often seen in groups searching for food or new shells. There are several kinds of hermit crabs on Guam. Most live in the sea but a few live on land.

All hermit crabs are hatched from eggs laid in the sea. After spending a few weeks as tiny drifting larvae, they settle to the bottom and find a tiny empty shell to live in. Most kinds of hermit crabs spend their entire lives in the sea, but land hermit crabs crawl out onto the beach soon after finding their first shell. Once they hit the beach, they stay on land, except when the female returns to the water to lay her eggs.

After their drifting larval stage, hermit crabs spend their entire lives inside a borrowed shell which they use for protection, since their own body covering is soft and weak. When they outgrow a shell they simply find another slightly larger one and trade. The giant African snail has been a real friend to land hermit crabs since their empty shells make perfect homes.

Land hermit crabs are most abundant near the beach, but they may also be found far inland. They feed mostly at night and remain in cool shady places during the heat of the day. Finding food is not a problem for hermit crabs since they will eat almost anything including coconuts and other fallen fruits, plant material, rotting wood, dead animals, and garbage.

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1994

Photo by H. D. Pratt

DULILI (Lesser Golden-Plover)

Pluvialis dominica

Migratory Shorebird

The Lesser Golden-Plover, known in Chamoru as dulili, is Guam's most common shorebird. Each year, this bird arrives by the hundreds from August to October to spend the winter on Guam's warm beaches and lawns. In April, it migrates all the way to Alaska and Russia to raise a family.

Northern summers are short, so these birds hurry to raise their young before the weather becomes cold. The parents make hidden nests on the ground. They feed insects to their chicks. In the fall, plovers fly to the tropical Pacific.

Dulili spend much of their time searching for tiny crabs and marine worms on the reef. They can also be found on lawns in winter, hunting for flies and bugs. Their golden brown feathers fall out as summer gets closer. New black feathers grow out on their front. A dulili's head becomes white on the sides and neck. This beautiful color change attracts a mate to help raise a family.

A few dulili stay all summer and never fly north at all. These are young birds not old enough to breed. Their color never changes and they spend the summer at the beach. Dulili will gather with other shorebirds. Each kind of shorebird hunts a different way or eats a different food so there is plenty of food for all.

Another common kind of plover on Guam is the Mongolian Plover (*Charadrius mongolus*). Other plovers, although uncommon, are the Black-Bellied Plover (*Pluvialis squatarola*), the Great Sand-Plover (*Charadrius leschenaultii*), the Common Ringed Plover (*Charadrius hiaticula*), the Little Ringed Plover (*Charadrius dubius*), and the Snowy Plover (*Charadrius alexandrinus*). All plovers share the collective Chamoru term "dulili" and all are protected under the Federal Migratory Bird Act.

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1994

DAWR photo by Anne Maben

EGIGI (Micronesian Honeyeater)

Myzomela rubrata saffordi

Endangered Species **Subspecies endemic to the Marianas**

Extinct on Guam

Once common, the Micronesian Honeyeater has not been observed on Guam since 1986. Predation by the introduced brown tree snake is responsible for the bird's decline. Fortunately, this species still occurs on most other islands in the Marianas.

Known in Chamoru as the "egigi", the honeyeater was one of Guam's prettiest songbirds. Its song consisted of a melodious series of notes sung at dawn. It called other egigi with a two-note whistle.

Egigi were very active when eating nectar from the flowers of hibiscus, coconuts, and other plants. They hopped about rapidly and could visit 20 to 30 flowers per minute. Their long, curved bill helped them reach the sweet nectar. This species also ate insects that became trapped inside the flowers.

Egigi built tiny cup-shaped nests out of grasses, roots and ironwood needles glued together with spider webs. They usually laid two off-white colored eggs spotted with brown each year. Male egigi would defend a nesting and feeding area for their family. A flash of bright red was often all you would see as an angry male chased an intruder away with its loud scolding call.

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DAWR photo by Anne Maben

EURASIAN TREE-SPARROW

Passer montanus

Introduced Species

The Eurasian Tree-Sparrow was introduced to Guam after World War II and is one of the most common birds remaining on our island today. The tree-sparrow is mostly brown with a black chin and ear patches. Some people have confused the tree-sparrow with the Rufous Fantail, a native forest bird that is now extinct. The tree-sparrow is even mistakenly called the "chichirika", which was the Rufous Fantail's Chamoru name. However, because a local name was never given to the tree-sparrow, the term "chichirika" has come to mean any tiny brown bird.

The tree-sparrow is a tame urban dweller. It lives in close association with people and stays away from forests. Flocks of tree-sparrows can often be seen around city streets, large buildings, parks, and homes. At night, they gather in large groups to roost. Just before dusk, roosts are noisy locations with many birds chirping. These roosts normally occur in large trees found in open lawns or downtown areas.

Unlike nearly all of Guam's native birds, the Eurasian Tree-Sparrow has been able to survive on the island despite the presence of brown tree snakes. Snakes do prey on some tree-sparrows, however, many birds avoid snakes by sleeping and nesting in places where snakes are unable to go. Tree-sparrow nests are made of dried grasses and usually contain four to six eggs. They are placed in many kinds of buildings and structures.

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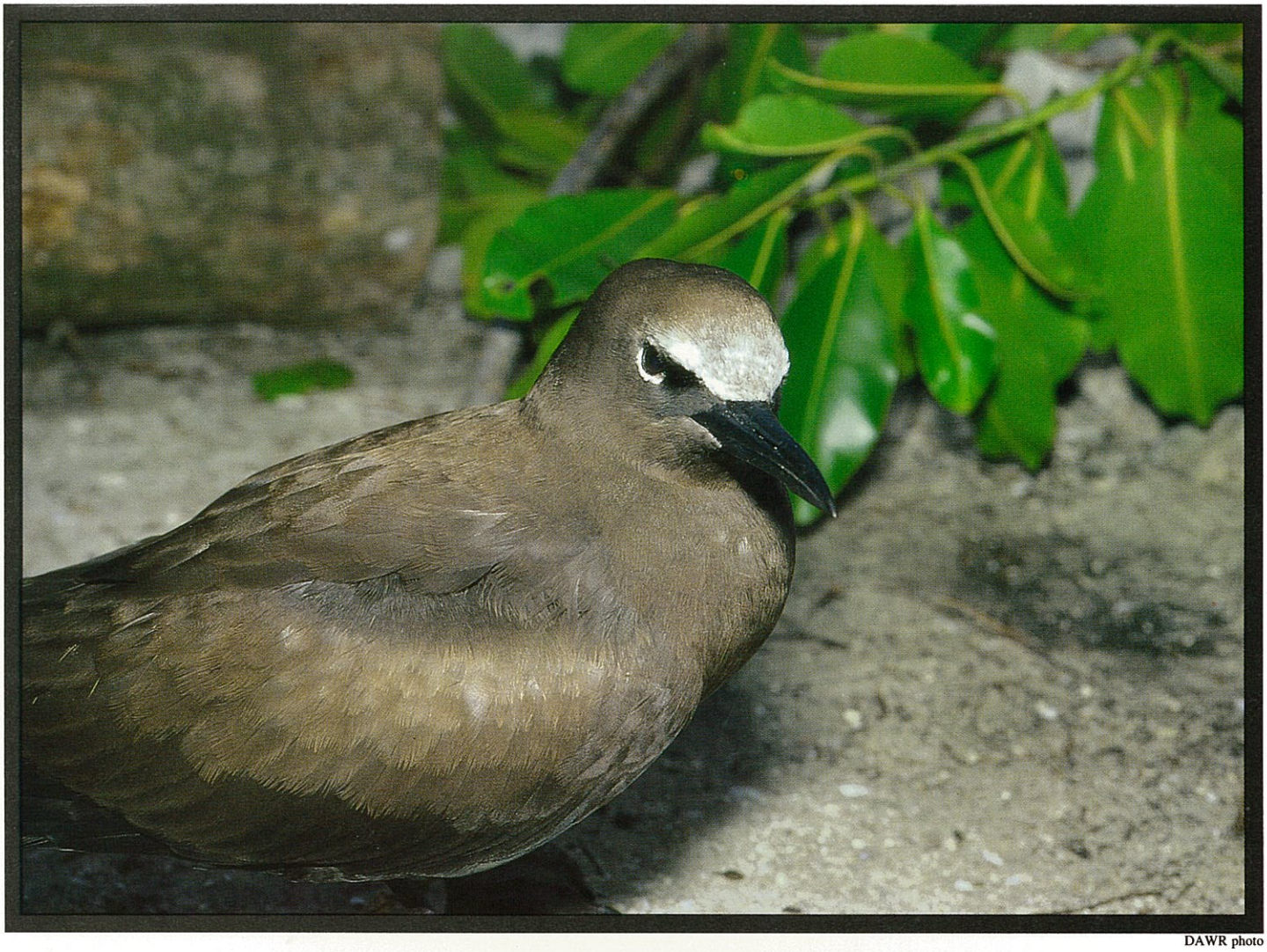

DAWR photo

FÅHANG (Brown Noddy)

Anous stolidus

Native Seabird

The Brown Noddy, known in Chamoru as "fåhang", is a popular bird with Guam's fishermen. These brown seabirds follow schools of small fish and squid that big fish such as yellowfin tuna and måhimåhi also chase. By following the fåhang, fishermen can locate schools of big fish to catch. Unlike some seabirds, fåhang do not dive for fish, but skim along the surface of the water and snap up their prey in flight.

These able-bodied fliers nest mostly at Orote Point, buoys in Apra Harbor, and small islets along Guam's southwest and northeast coasts. Sometimes you can see fåhang perched on the reef or on floating logs. When they want a bath, they dip their head and chest into the water. Like other seabirds, they drink saltwater. They have a special salt gland that gets rid of the extra salt.

The name noddy comes from the male's habit of bobbing his head at a female when it is time to mate. The birds build their nests of sticks on limestone rocks, cliff faces, and in trees. The fåhang's brown color blends in perfectly with the rocky cliffs. The female lays one egg and sits on the egg while the male brings her food. Baby fahang are covered with grayish down and will often eat their weight in fish every day. Parents protect their young carefully and will even attack people who come too close to the nest.

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