

# SEA TURTLE CONSERVATION AND MANAGEMENT IN JAPAN

By:

Osamu Abe  
Ishigaki Tropical Station,  
Seikai National Fisheries Research Institute

## INTRODUCTION

The ASEAN member countries signed “Memorandum of Understanding on ASEAN Sea Turtle Conservation and Protection (1997)” (MOU) and recognized the significance of the sea turtle populations and their habitats in ASEAN waters. Increasing threats to nesting environment is severe for survival of sea turtles. Incidental captures of sea turtles by several fisheries are of international concern. For the conservation of sea turtles, the Japanese government regulates direct take of turtles, international trade, domestic trade and possession of both animals and products; promotes reduction of artificial debris from nesting beaches and marine habitats; promotes projects to prevent poaching eggs and hatchlings; promotes research efforts to determine the status of each sea turtle population around the Japanese waters, such as tagging project, monitoring nesting activity and hatch success.

Considering that sea turtles migrate oceanic waters widely, an effective recovery plan must include international cooperation, in addition to the domestic conservation plan. This report provides general information about recent status of conservation and management of sea turtles in Japan for building up international cooperation among the ASEAN countries.

## POPULATION AND DISTRIBUTION OF SEA TURTLE

### Information on the species found and some historical data on the population and its geological distribution

Six species of sea turtles occur in the Japanese waters. Three species of sea turtles, loggerhead turtle (*Caretta caretta*), green turtle (*Chelonia mydas*) and hawksbill turtle (*Eretmochelys imbricata*), nest in the coast of Japan (Uchida & Nishiwaki, 1982). Leatherback turtle (*Dermochelys coreacea*) and olive ridley turtle (*Lepidochelys olivacea*) migrate to Japanese waters (Nishimura, 1964; Nishimura *et al.*, 1972). Black turtle (*Chelonia agassizzi*) was captured recently in Japan (Kamezaki *et al.*, 1998).

#### *Loggerhead turtle*

Loggerhead turtle tends to nest at temperate area relative to other sea turtle species. Nesting ground of the loggerhead turtles in Japan is along the coast of Honshu, Shikoku, Kyushu and Nansei Archipelago. The northern edge of the nesting ground in Japan is about 37N both in the Pacific coast and in the Sea of Japan coast (Uchida, 1994?). Loggerhead turtle is the most common species along the coast of Japan and all nesting sea turtles in Honshu, Shikoku and Kyushu is this species.

It is suggested that the loggerhead turtles migrate in the north Pacific Ocean belong to the same population and can be separated from the south Pacific population. Juvenile loggerhead turtle is abundant off the western coast of North American Continent where no nesting beach occurs, while juveniles are very rare along the coast of Japan (Dodd, 1988; Rene Marquez, 1990). Genetic researches and satellite tracking of juvenile turtles suggest that the transpacific movement of the loggerhead turtles; the hatchlings from Japanese nesting beaches move across the Pacific Ocean toward the east, grow up off the western coast of North American Continent and then migrate west to the Japanese waters to breed (Bowen, *et al.*, 1995; Resendiz *et al.*, 1998). The coast of Japan is the main nesting ground of the northern Pacific

population of the loggerhead turtle. Information of the nesting ground in China is limited; nesting occurs principally on Hainan Island (Rene Marquez, 1990). Therefore, the Japanese waters are very important as a breeding area of the loggerhead north Pacific population.

Tag returns from the loggerhead turtles after nesting on the beaches in Japan indicate many turtles migrate to the East China Sea to forage, while some individuals nested on Kyushu coast were recaptured along the Pacific coast of Honshu (Iwamoto *et al.*, 1985; Nakashima and Nakamura, 1994; Kamezaki *et al.*, 1997). One of the loggerhead turtle nested on Ryukyu Archipelago was recaptured off the mouths of Mekong River and nested again on the same beach released, suggesting that the foraging ground of the loggerhead turtles is expanding to the South China Sea (Sadoyama *et al.*, 1996).

### ***Green turtle***

Green turtle inhabits in the Japanese waters along the coast of the Sea of Japan and the Pacific Ocean. An occurrence of this species is reported from Muroan, Hokkaido, 42N, which is thought to be the northern edge of migrating area in the Japanese waters (Suganuma, 1994). Nesting of green turtle occurs mainly in sub-tropic and tropic area (Rene Marquez, 1990). The northern edge of nesting ground in Japan is Yakushima Island, 30N.

The biggest nesting ground of green turtle in Japan is Ogasawara Islands. The tagging project shows that after breeding on Ogasawara Islands, the green turtles migrate to forage along the coast of Nansei Archipelago, Kyushu, the Pacific coast of Honshu and Shikoku (Tokyo Metro. Fish. Exp. Station, 1986). Juvenile green turtles tagged and released from Ogasawara Islands, were recaptured in about the same area as the foraging ground of the breeding population, while some immature turtles inhabit around Ogasawara Islands (Tokyo Metro. Fish. Exp. Station, 1986). The green turtles around the Ogasawara waters have unique genotype comparing to the other Indo-Pacific and Atlantic populations (Bowen *et al.*, 1992).

### ***Hawksbill turtle***

Hawksbill turtle is the most tropic species of all sea turtles (Rene Marquez, 1990). Japan is the northern margin of the distribution of this species in the Pacific Ocean (Uchida and Nishiwaki, 1982). Hawksbill turtles are captured or found stranded along the coast of the Sea of Japan throughout Hokkaido (Nishimura, 1967), while along the Pacific coast the occurrence of the hawksbill turtles is limited to the Kuroshio area. No matured hawksbill turtles was captured north of Nansei Archipelago. The hawksbill turtles of the straight carapace length from 289 to 820 mm inhabit in Nansei Archipelago (Kamezaki and Hirate, 1992).

The northern margin of the nesting ground of this species is at about 28N, where is the limit of the formation of coral reefs (Uchida, 1982). Nesting population of the hawksbill turtles in Japan is small, only 57 records of nesting activities (including false crawls) are reported during 1973 to 1994 in Ryukyu Archipelago (Hirate, 1995).

### ***Leatherback turtle***

Leatherback turtle is a highly pelagic species which has high swimming ability (Rene Marquez, 1990). It nests in sub-tropic and tropic area, while it is adapted to colder water than the other sea turtles are. As a result, leatherback turtle inhabits throughout to the northern margin of the Berling Sea in the Pacific Ocean. Leatherback turtles are found stranded or captured along the coast of Japan from Okinawa to Hokkaido (Nishimura, 1964; Kamezaki, 1994). The straight carapace length of these samples ranges from 50 to 190 cm, showing leatherback turtles of the wide size range are migrating in the Japanese waters (Kamezaki, 1994). There is no record of nesting of this species in Japan.

### *Olive ridley turtle*

Olive ridley turtle is captured or found stranded along the coast of Japan; 40 records of olive ridley turtle were reported between 1957 and 1993 (Suganuma, 1994). They were found south of Akita along the coast of the Sea of Japan, south of Kanagawa along the coast of Pacific Ocean to the southern extreme of Okinawa. No nesting was reported in the Japanese coast. The olive ridley turtles found in the Japanese waters are thought to be stray individuals from the population of the South China Sea, which are caught and subsequently carried northward into the East China Sea by the drift currents in the season of the southwest monsoon and some of which are further transported by the Kuroshio and the Tsushima Current into the Japanese waters (Nishimura *et al.*, 1972).

### *Black turtle*

Black turtle inhabits coastal waters of the eastern tropic Pacific Ocean (Rene Marquez, 1990). In 1998, three black turtles were captured at the first time at the southern extremes of Ryukyu Archipelago, which is the first record of the black turtle in the western Pacific Ocean (Kamezaki *et al.*, 1998). No nesting in Japanese coast was reported. Further investigation is necessary to find the migrating area of this species.

## **Factors that affect the change in population and distribution**

### *Nesting environment*

#### Coastal construction/Artificial lighting

Coastal construction and reclamation result in the degeneration and the loss of natural sandy beaches suitable for sea turtle nesting. Reclamation destroy sandy beaches directly. Sea walls or other beach armoring, such as coastal protection with tetrapod, degenerates the natural vegetation of the beaches and prevent the turtles from digging nest holes.

Cutting off of the back forest of the beaches in relation with coastal constructions, such as road, parking, building and resort development, induce artificial lights into nesting beaches, which interfere the nesting behavior of turtles and the sea-finding behavior of hatchlings. Some municipalities intend to take the sea turtles in consideration in constructing road or beach armoring. For example, in Shizuoka Prefecture, a bypass of national road beside the nesting beach was constructed with lights which may not affects on the behavior of sea turtles. The research project to monitor the effects of the construction should be carried out to reflect the results to future planning of coastal construction, in consideration of physiological and ecological requirements of sea turtles.

#### Beach erosion/Beach mining

Inflow of sand to the sea from rivers is decreasing because of river improvement and conservation work. While, beach mining and dredging are progressing, results in the reduction or elimination of the mass of sand in sandy beaches. It is reported that the loss of sands degrade the nesting habitat of the sea turtles in many beaches in Japan. Those nests in low sandy beaches are easy to be submerged or lost by weather events such as storms and high tide, which results in the reduction of hatching success.

#### Human presence/Vehicular driving/Debris on the beaches

Sea turtles prefer to nest on a dark, silent beach. Recreational uses, such as beach camping and fires on nesting beaches at night, interfere with nesting behavior of sea turtles. Vehicular driving on beaches crush turtle eggs and hatchlings in the nests directly, or destroy nest cavity which is important for the emergence of the hatchlings. The hatchlings just after emergence are trapped by wheel tracks left on the beach and exposed to exhaustion, dehydration and predators. In addition, vehicular driving on beaches degenerate the natural vegetation and accelerate the beach erosion. Many kinds of debris on

the beaches interfere with not only nesting behavior of the turtles, but also emergence and sea-finding of the hatchlings.

#### Nest predation/Direct take of eggs

Nest predation occurs in Ogasawara Islands by the ghost crabs, *Ocypode cordimanus* and the termites. In Zamami Island, Okinawa, turtle eggs and hatchlings are predated by the Japanese mink, *Mustela itatsi*, which was introduced to the island as a predator for venomous snakes. Illegal egg poaching by human is still exist in many nesting beaches.

#### **Marine environment**

##### Sea grass/Coral degradation

Dredging destroys sea grass bed which is important as a foraging habitat of green turtles. Terrestrial run-off and sedimentation of red-soil occurs in coral reef areas and the world-wide coral bleaching occurred in 1998 have resulted in the serious damage to coral ecosystem, which is a habitat of green and hawksbill turtles.

##### Debris/Environmental contaminants/Disease

Entanglement or ingestion of marine debris might be responsible for sea turtle mortality in the ocean. Tumor disease fibropapilloma is serious problem in Hawaii. However, sea turtles are free of fibropapilloma in the Japanese waters.

##### Fisheries

Fisheries targeting sea turtles is exist in Ogasawara Islands and in the part of Okinawa Prefecture. In Ogasawara Islands, more than 1,000 individuals of green turtles are captured annually in the late nineteenth century, which decreased to hundreds or less in the early twentieth century (Tokyo Metro. Fish. Exp. Station, 1986). Recently, less than 100 individuals of the green turtles of more than 75cm carapace length are captured in a year. In Okinawa Prefecture, about 200 individuals of sea turtles are captured annually; 90% of which is the green turtles, 10% is the hawksbill turtles and the rest is the loggerhead turtles. The green turtles are harvested as meat or stuffed animals and the hawksbill turtles are used as stuffed animals, tortoise shell, or carey in principle. More than 90% of sea turtles captured in Okinawa is taken at Yaeyama Islands, the southern margin of Okinawa. The restriction of the length is set only to the hawksbill turtle of less than 25cm in plastron length. Therefore, immature turtles may be consumed in Okinawa Prefecture.

Sea turtles are incidentally taken by several commercial fisheries within the Japanese waters, however available data for analysis of the impact of fisheries on the turtle populations is lacking.

#### **Global environment**

Global warming is a serious problem for the survival of sea turtles. Rise of the sea temperature might affect their migrating, foraging and nesting areas. Rise of the sea level might destroy their nesting beaches. As the sex of sea turtles is determined by the temperature during egg incubation period (Yntema and Mrosovsky, 1980), rise of the sand temperature in the nesting beaches induces biased sex ratio of the population, affects on the breeding behavior.

## NESTING SEASON AND EGG COLLECTION

### Historical data on nesting

#### *Loggerhead turtle*

Nesting season of the loggerhead turtles in Japan is mainly from May to August. Principle nesting beaches of loggerhead turtle in Japan are in Shizuoka, Wakayama, Tokushima, Miyazaki and Kagoshima Prefectures. In Wakayama Prefecture, on Senri Beach (1.5km), Minabe, 100 to 350 nests are counted annually (Goto and Uemura, 1994; Sato *et al.*, 1997). In Tokushima Prefecture, on Ohama Beach (500m), Hiwasa, 20 to 300 emergence occurs and nest success rate is about 81% (Nakahigashi, 1994; Kuribayashi, 1998). On Kamouda Beach (500m), Anan, Tokushima Prefecture, the number of emergence of nesting turtles excess 700 in late 1950's, however, it decreased to about 100 in these years and nest success is 60.7% (Kamata, 1994). On Miyazaki Beach (15.9km), Miyazaki Prefecture, 200 to 400 of annual nesting are recorded (Iwamoto *et al.*, 1985; Ishii, 1994). In Kagoshima Prefecture, 20 to 40 nests are counted on Nagasakibana Beach (2km) (Samejima, 1994). Yakushima Island, Kagoshima Prefecture is one of the most important nesting ground of the loggerhead turtles and more than 1,000 of nests are recorded in some years (Oomuta, 1994). On Kuroshima Island, Okinawa Prefecture, the number of nests excess 40 in 1980's, however below 10 in these years (Hirate *et al.*, 1994). Although fluctuation is large in numbers in the most nesting beaches, the annual number of nests tend to decrease in many nesting beaches (Kamata, 1994; Hirate *et al.*, 1994; Sato *et al.*, 1997).

Sea turtles nests several times in one nesting season, therefore the number of nesting females is much less than the number of nests found on the beach. It is necessary to distinguish each individuals to estimate the number of nesting females for planning the conservation of the nesting population.

#### *Green turtle*

Nesting of green turtles occurs in Ogasawara Islands and in Nansei Archipelago in Japan. Within Ogasawara Islands, population around Chichijima Islands and that around Hahajima Islands is separated (Suganuma, 1994). In Chichijima Islands, 100 to 600 nests are recorded annually and the number of nests tend to increase in these years (Ogasawara Marine Center, 1999). The possible reasons for the increase of the nests is the increased survival rate of nesting females induced by reducing fishing effort around the islands and the effects of the head starting projects, in which about 200,000 of hatchlings have been released since 1976. There is no tendency to increase in the number of nests in Hahajima Islands in Nansei Archipelago, about 50 nests are found on Ishigaki Island annually, however, those data to discuss about the status of the population is lacking.

#### *Hawksbill turtle*

In Japan, only a few nesting of the hawksbill turtle are recorded in a year (Hirate, 1995). Therefore, it is difficult to discuss about the status of the population.

### Regulations regarding egg collection

It is prohibited to collect and sell the eggs of the sea turtles in Japan by laws, such as "The Fisheries Law", "Living Aquatic Resources Protection Law" and "Law for the Conservation of Endangered Species of Wild Fauna and Flora". Therefore, no officially approved markets of turtle eggs exist. Those who poach and sell eggs or hatchlings against law are strictly imposed to penalties.

## CONSERVATION AND MANAGEMENT PROGRAMS

### Projects

The Japanese government is promoting projects to reduce artificial debris from nesting beaches and marine habitats; projects to prevent poaching eggs and hatchlings; tagging and satellite tracking projects for the determination of the population structures as a conserving unit; monitoring projects of nesting activities and hatch success for the estimation of the status of the nesting population of sea turtles in the Japanese waters.

### Local efforts

In many local areas, sea turtles are symbolized for the municipalities and the conservation of beaches. One example is Hiwasa City, Tokushima Prefecture (Kuribayashi, 1998). A field research to count the turtle nests was started at 1950 by a local junior high school, which has met with a public response within and without the prefecture. The loggerhead turtle and its nesting beach was designated as a natural monument of the prefecture in 1958 and of the nation in 1967. Hiwasa City enforced the regulation for the conservation of sea turtles in 1995, which prohibit to drive the roads along the nesting beach at night during the nesting season from June through August. The city build a Sea Turtle Museum in 1975 and shows the nesting behavior of the sea turtles to the limited number tourists under the guide for the educational purpose.

## RESEARCH ACTIVITIES

In this section, some topic research activities recently carried out in Japan are introduced. Biological studies on sea turtle in Japan is summarized by Kamezaki and Matsui (Kamezaki and Matsui, 1997).

### Distribution/Genetics

It is very important to investigate the habitat and the migrating route of sea turtles for determination of the population as a conserving unit. Tagging projects have been carried out in many areas for the nesting and the foraging turtles. Sea Turtle Association of Japan, which is a NGO concerning sea turtle biology and conservation, standardized the tags and more than 15,000 tags have been distributed to the researchers and the volunteers all over Japan since 1991 (Sea Turtle Association of Japan, 1997). Using the passive integrated transponder (PIT) tags for smaller turtles for longer periods is on trial (Kuroyanagi *et al.*, 1998).

Genetic studies have been carried out to study the population structure of sea turtles around Japanese waters (Bowen *et al.*, 1992, 1995; Okayama *et al.*, 1999).

Satellite tracking has been carried out to investigate the migration route, nesting and foraging habitat of sea turtles around Japanese waters.

### Development/Growth

Some aquarium, such as Nagoya Port Aquarium, Kushimoto Marine Park and Okinawa Expo Aquarium, have been succeed in breeding sea turtles in the aquarium.

As the sex of sea turtle is determined by the sand temperature in the nest, the number and the sex ratio of emerging hatchlings is estimated by monitoring the sand temperature, the number of nests and the clutch size in the exact nesting beach (Matsuzawa *et al.*, 1998).

## LAW AND ENFORCEMENT

### National Government

The conservation and management of fisheries resources are under regulatory control of “The Fisheries Law” and “Living Aquatic Resources Protection Law”. Ministerial ordinance based on the “Living Aquatic Resources Protection Law (1993)” prohibits to take animals or eggs of olive ridley turtles or leatherback turtles in the area between south to 60N and north to 40S. “Law for the Conservation of Endangered Species of Wild Fauna and Flora (1993)”, which intend to protect endangered species, lists up sea turtles as the international endangered species. It prohibits to sell or to possess sea turtles and the turtle products obtained against the law by catch or by import.

### Prefectures and Municipalities

#### *Regulations for fisheries*

Marine Fishery Adjustment Commission decides restriction of marine resources and prohibits in principle to take five species of sea turtles, *i.e.*, loggerhead, green, hawksbill, leatherback and olive ridley turtles, in the following sea-areas; Islands of Tokyo, Ogasawara, Chiba, Shizuoka, Mie, Wakayama, Kochi, Miyazaki, Kagoshima, Okinawa, Kumage and Amami. However, in some prefectures, Prefectural Fisheries Adjustment Regulation regulates sea turtle fisheries, which has higher binding force than the decision of the Commission.

In Okinawa Prefecture, the approval of the Marine Fishery Adjustment Commission is necessary to operate sea turtle fisheries. It is against the Prefectural Fisheries Adjustment Regulation for unlicensed people to catch sea turtles (loggerhead, green and hawksbill turtles) from June through July, to take eggs of sea turtles and the hawksbill turtles of less than 25 cm plastron length throughout the year. It is prohibited to possess or to sell the turtles or the products obtained against the regulation. The penalties for the violation of the regulation is penal servitude of less than 6 months or a monetary fine of less than 100,000 yen, or both of them.

In Ogasawara, permission of Governor of Tokyo is necessary to operate green turtle fisheries (Tokyo Metropolitan Fisheries Adjustment Regulation). The permission includes the upper limit of the number of individuals allowed to catch. It is prohibited to take turtles from June through July, to take individuals of less than 75cm curved carapace length and eggs throughout the year. Those who are against the regulation are punished with a similar penalties as in Okinawa. To catch loggerhead turtles and hawksbill turtles, approval of the Marine Fishery Adjustment Commission is necessary.

#### *Regulations for conservation*

Kagoshima Prefecture enforces the regulation for the conservation of sea turtles to protect the sea turtle eggs and individuals which emerge to nest on the beaches. The penalties for the violation of this regulation is penal servitude of less than 6 months or a monetary fine of less than 300,000 yen. Conservation of sea turtles is specified in environmental regulations enforced in some municipalities, such as in Kihicho (Mie Prefecture), in Fukiage-cho (Kagoshima Prefecture), in Hiwasa City (Tokushima Prefecture). Although sea turtle conservation is not specified, prohibition of vehicular driving on the beaches is specified in environmental regulations of some municipalities, such as in Kosai City and Arai-cho (Shizuoka Prefecture), on Kujukuri-hama Beach (Chiba Prefecture), on Ohama Beach and Kamouda Beach (Tokushima Prefecture). The penalties for the violation of these regulations are penal servitude of less than 6 months or a monetary fine of less than 300,000 yen.

Some municipalities keep night patrols on the beach to enforce the regulations. However, one of the difficulties is to keep the budget and the educated staffs for the beach patrol and the conservation effort.

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