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SUMMARY OF JAPANESE ACTIVITIES FOR THE MITIGATION OF INCIDENTAL CATCH OF SEABIRDS AND SEA TURTLES IN LONGLINE FISHERY

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There is a growing concern over the impact of fishery on marine ecosystems. At the 23rd FAO Committee on Fisheries in February 1999, International Plans of Action for the Conservation and Management of Sharks (IPOA-Sharks) and for Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA-Seabirds) were adopted. Following this decision, Japan developed its National Plans of Action (NPOAs) for sharks and seabirds through examination and deliberation by the consultative committee as well as discussion within the government, and reported it to the 24th FAO Committee on Fisheries in March 2001. Under these national plans, Japan has been striving to ensure rational conservation and sustainable use of shark resources based on scientific information and to mitigate seabird interactions for sustainable coexistence of fishery and seabirds.

Japan also supported FAO's initiatives for the conservation of sea turtles. FAO held expert and technical consultations on sea turtles and fisheries in 2004 and established the guidelines to reduce sea turtle mortality in fishing operations in 2005. Japan has already launched programs to reduce fishery interactions and to conserve nesting populations of sea turtles, and now preparing for drafting the national plan of action on sea turtle conservation and fisheries.

This paper introduces the activities to mitigate the interactions between pelagic tuna longline fishery and seabirds and sea turtles according to the Japan's NPOAs and FAO guidelines.

1. ACTIVITIES UNDER JAPAN'S NPOA-SEABIRDS

The major scope of Japan's NPOA-Seabirds is to minimize incidental capture of seabirds in longline fishery through development and implementation of mitigation measures. Japan's NPOA-Seabirds sets voluntary measures to reduce incidental catch of seabirds in longline fishery. It also promotes research and development of mitigation technique, education and enlightenment of fishers, conservation and improvement of breeding environment of short-tailed albatross in Japan, data collection for fishing operations and for at-sea ecology of seabirds, and international cooperation (Kiyota et al. 2003).

1.1. Measures to reduce incidental catch of seabirds

The NPOA-Seabirds requires fishermen to rescue and release live seabirds caught incidentally, as well as to control offal discards properly. For the southern bluefin tuna fishing area in the Southern Ocean, the use of tori-poles is obligated for all vessels following the regulation of CCSBT. In addition, longliners in this area are requested to adopt at least one of the following measures: night setting, weighted branch lines, use of bait casting machines or fully-thawed baits. In the North Pacific north of latitude 20 degrees north, at least one measure is requested from the following list: tori-poles, night setting, line weighting,

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bait casting machines, and fully-thawed baits. In the critical area around Torishima Island of the Izu Islands, where breeding colonies of short-tailed albatross (*Phoebastria albatrus*) exist, use of two or more mitigation measures is requested during the period from October to May.

Japan's NPOA-Seabirds was revised in 2005 and set a target which aims to achieve full implementation of the above mitigation measures by 2015. The Japanese government is striving to ensure progressive implementation of the NPOA-Seabirds.

1.2. Research and development

Mitigation measures: In Japan, continual efforts have been made to develop mitigation measures to reduce incidental capture of seabirds. Since albatrosses and large petrels susceptible to longline interactions are surface scavengers, incidental catch of seabirds in the longline fisheries occur in a limited zone near the sea surface behind the stern of vessels while lines are set. Any devices that prevent seabirds from feeding in this 'bird zone' will reduce the occurrence of incidental hooking. The following methods have been invented and tested in Japan by scientists, engineers and fishers to diminish seabird interactions in longline fishery;

Bird deterrent devices
- Tori-pole (bird-scaring line)
- Water cannon
- Flash light and laser beam
- Acoustic, magnetic and electric deterrent

Improvement of sinking speed of baited hooks
- Line weighting
- Thawing bait
- Use of bait casting machine
- Underwater setting
- Side setting

Reducing visibility of bait
- Colored bait
- Line setting at night

Reducing attractiveness of the vessel
- Control of offal discards

Tori-pole is a cost-effective method, but efforts should be made to adjust the configuration and use of the device so that it will exert maximum deterrent performance. Although blue-dyed bait is a method with high potential, the cost and labor involved in preparing colored bait must be reduced. Improvement of bait sinking speed, if combined with other deterrence methods, is expected to reinforce the effectiveness of the other techniques but due consideration should be given to reducing operational burdens and risks to fishers. Supplementary methods, such as night setting and strategic control of offal discards, will be improved, taking into account the views of fishers who work at sea. Experiment on side-setting method was conducted in April-May 2006 using a large-sized distant-water type research vessel. Two sets of line setting equipment were installed at the end and side of the stern deck, and the performance of stern and side setting were compared. Preliminary analysis of the results indicate satisfactory performance of side-setting in practical feasibility and improving sink rates of baited hooks.

In developing seabird-avoidance techniques, both scientific data from experimental survey and empirical information from fishers are indispensable. It is important to develop various possible methods through research, inform fishers about the methods, test them in the actual fishing grounds, and collect feedback from the fishers about their effectiveness and drawbacks. In this respect, Japan's NPOA promotes research and development and education and outreach in parallel.

At-sea ecology of seabirds: Sighting surveys of seabirds have been conducted using research vessels in

order to clarify spatial and temporal changes in the distribution of albatrosses in the waters adjacent to Japan. It has been confirmed that short-tailed, Laysan (*D. immutabilis*), and black-footed (*D. nigripes*) albatrosses are distributed in the waters near Japan from late autumn to late spring (Minami et al. 2000). Short-tailed albatrosses were observed not only around the breeding colonies in the Izu Islands and the Senkaku Islands, but also in the area off the Pacific coast of northeastern Japan, where they are supposed to feed during the breeding season or to stop by when they migrate between the breeding islands and summer foraging area.

Knowledge of the feeding habits of seabirds will help to estimate the vulnerability of each species to fisheries interactions. For this purpose, stomach content and stable isotope analyses have been conducted in Japan to compile information on trophic status in marine food web. Results of the stable isotope analysis of southern seabirds identified three distinct feeding guilds: (1) large albatrosses and mollymawks preying on species in high trophic levels, (2) petrels which prey on species at lower trophic levels, and (3) albatrosses and petrels which feed on wide range of prey species crossing the border of Southern Ocean and Antarctic ecosystems. In general, seabirds in higher trophic levels tend to be scavengeous and are more susceptible to fisheries interactions.

1.3. Conservation of breeding habitat

Other than fisheries, seabird populations are affected by a number of natural and anthropogenic factors. For the conservation of seabirds, all the potential impacts should be assessed and managed. For example, short-tailed albatross was once brought close to extinction due to over-exploitation for feathers until the late 1930s. Small number of birds were re-discovered in Torishima of Izu Islands, Japan in the 1950s, and since then efforts have been made to recover the breeding colony of this species. Management of terrestrial environment of the Torishima island, including extermination of feral cats, prevention of landslides and erosion by constructing wooden fences and by transplanting native grasses, and induction of a new colony to a stable location by attracting newly-breeding birds with decoys and vocal playbacks, have been successful in recovering the population up to 2,000 birds by 2005 (Hasegawa, personal communication).

1.4. Data collection

Japan has been collecting information on incidental take of seabirds and other species through scientific observer programs, investigational fishing operations by research and training vessels and reports from commercial fishing vessels. Scientific observer programs are currently conducted for Japanese longline fishery in the Atlantic Ocean and Southern Ocean. Research and training vessel data covers mainly the Central and North Pacific area and provides precise data of both target and non-target species, although they entail biases in fishing area and fishing season. Reported data from commercial vessels have problem in reporting rate and certainty (e.g. species identification). These data provide the basis for the analysis of incidental take in longline fishery.

1.5. Education and enlightenment

Educational activities for fishers are being carried out in order to inform them about the importance of accurate reporting of incidental take of seabirds, how to avoid incidental catch, and appropriate handling of birds captured alive. The following materials are prepared and used for the educational program;

- Identification sheets and guidebook for seabirds
- Booklets and leaflets that illustrate methods for avoiding incidental take and appropriate handling of seabirds captured alive;
- A guide book which summarizes the NPOA-Seabirds and NPOA-Sharks.
- A cartoon book, “For the Future of Tuna Fisheries and Seabirds” which outlines the issue of incidental take in an understandable manner.

- A video program (VHS and DVD) which explain mitigation measures to reduce longline interactions with seabirds and sea turtles.

The Fisheries Agency, the Global Guardian Trust, and the National Research Institute of Far Seas Fisheries (NRIFSF) are holding seminars for fishers in local fishing communities to introduce the NPOA-Seabirds and NPOA-Shark. Instruction on mitigation techniques and methods for releasing live birds is provided in these seminars. Lectures are also given to the teachers of high schools engaged in training students for fisheries.

2. SEA TURTLES

Due to their amphibious life cycles, sea turtle populations have been affected by a large variety of factors. Both human activities (e.g., direct take, beach development, collisions with boats, disturbance of nesting beaches) and non-human factors (e.g., predation, disease, climatic change) put adverse impacts on sea turtle populations on land and at sea (FAO 2004). Since sea turtles are highly migratory and have wide distribution at sea, they interact with many kinds of fisheries in the coastal and oceanic regions. Trawl, gillnet, set-net, trap, purse-sein, and longline are major types of fishing gears that interfere with sea turtles. Holistic approach to manage various factors affecting sea turtle populations is necessary for the conservation of sea turtles. Report of the expert consultation and guidelines of FAO emphasize the importance of holistic management (FAO 2004, 2005). Japan follows the holistic approach and have already conducted various activities to mitigate sea turtle-longline interactions and to conserve breeding populations (Kiyota et al. 2005). Japan is also preparing for drafting the Japan's NPOA for the conservation of sea turtles now.

2.1. Research and development

Mitigation measures: Experimental fishing operations using research vessels and commercial vessels and captive experiment were conducted to develop mitigation technique to reduce incidental mortality of sea turtles in longline fishing operations. The following techniques have been developed and tested in Japan:

Gear and bait modification
- circle hook
- bait type (fish vs squid)
- bait color

Fishing practice modification
- deep setting (mid-water float system)

Handling and rescue
- dehooker, line cutter
- hoop net

Circle hooks have been shown to be effective in reducing damages to sea turtles, because sea turtles are less likely to swallow circle hooks compared with conventional hooks. The effect of circle hooks on catch of tuna, billfish and shark are also investigated (Yokota et al. in prep.). Ideal size and shape of circle hooks are being studied through captive experiment and thorough experimental fishing operations (Yokota et al. in press). It is known that the use of fish bait instead of squid bait can reduce the rate of incidental catches down to approximately 25%. So far bait color has shown little effect on feeding rate of sea turtles both in captive and at-sea experiments. Mid-water float system was developed to set baited hooks at a certain depth (Shiode et al. 2005). But the system is still in developmental stage. Practical tools and methods to rescue and release live-captured sea turtles have been developed. Captive studies on post-hooking survival of sea turtles are also conducted in Japan.

***At-sea ecology*:** Satellite telemetry of loggerhead (*Carretta caretta*) and leatherback (*Dermochelys coriacea*) turtles have been conducted to identify their important habitat at sea. Satellite tracking of loggerhead turtles revealed two distinct overwintering habitats of post-nesting females in the western north Pacific and in the East-China Sea (Nobets et al. 2005). Satellite tracking of post-nesting leatherback

turtles in Irian Jaya, Indonesia, indicated a migration pathway from Micronesian waters to northeastern Pacific off California via Hawaiian area. Genetic analyses of samples of the two species collected around Japan are conducted to examine stock structure and/or origin of migrating sea turtles. Stable isotope study is conducted to identify the feeding ground of post-nesting loggerhead turtles.

2.2. Conservation of breeding habitat

Many problems still exist around the nesting environment of sea turtles (FAO 2004). Destruction of spawning beach by coastal erosion or construction, beach disturbance by tourists, predation on eggs and hatchlings are the examples. In some regions adult turtles and eggs are harvested for subsistence or commercial purposes. While beach conservation programs have been taken in some areas, the scale of these measures is still insufficient compared to the global distribution of sea turtle spawning beach.

Most populations of Pacific leatherback turtles are declining (Chaloupka et al. 2004). The breeding colony in Terengganu, Malaysia has collapsed due to egg harvesting and beach development for tourism. The nesting beach in Papua, Indonesia holds the largest population in the Pacific. The population is at low level because of egg harvesting, predation by wild pig, and low hutching rate of eggs. The Everlasting Nature of Asia (ELNA), NRIFSF and Indonesia Sea Turtle Research Center have been conducting a conservation project to protect and monitor the nesting population of leatherback sea turtles in Jamursba-Medi and Wermon, Indonesia (Suganuma et al. 2005). Nesting populations of loggerhead turtles in Japan are monitored by local volunteers. Total number of loggerhead nests in Japan shows a rapid increase in recent years to the highest level in these 20 years (Sea Turtle Association of Japan, http: //www.umigame.org).

2.3. Education and enlightenment

Educational materials for fishers are developed and used in the seminars as described in seabird activities. The Organization for the Promotion of Responsible Tuna Fisheries (OPRT) promotes a grant program for distributing circle hooks for Japanese longline fishers.

As for capacity building in coastal developing countries, the Overseas Fishery Cooperation Foundation (OFCF) has launched a project with IATTC last year for introduction of circle hooks to small coastal longline fisheries. (The annual budgetary scale is about 500,000 US dollars.) In 2005, for the first year of this project, seminars for fishers in local fishing communities, distribution of circle hooks and dehookers and data collection on effect of these mitigation measures has been carried out in Ecuador.

In July 2005, the Third International Fishers Forum (IFF3) was held jointly with the International Tuna Fishers Conference on Responsible Fisheries in Yokohama. The forum was attended by 243 participants of various background from 28 countries; fishers, government officials, researchers, traders, distributors, consumers, environmental non-governmental organizations, civilian organizations, regional fisheries management organizations, and FAO. This forum aimed at facilitating identification, discussion, planning and implementation of effective practices and approaches to mitigate incidental catch of seabirds and sea turtles in longline fisheries. As an outcome, the declaration of responsible tuna fishers, ‘YOKOHAMA DECLARATION’, was issued (http://www.fishersforum.org/).

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