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OVERVIEW OF JAPANESE TAGGING PROJECT ON TROPICAL TUNAS IN THE TEMPERATE AREA OF JAPANESE WATER

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Overview of Japanese tagging project on tropical tunas in the temperate area of Japanese water

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Summary

Tropical tuna tagging project targeting bigeye and yellowfin tunas in the temperate area of Japanese water (in the area east off Honshu) has been being conducted by National Research Institute of Far Seas Fisheries in cooperation with Miyagi Prefecture since 2006. Feasibility studies were conducted until 2007 and the first practical tagging was conducted between June and July 2008 using pole and line gear by research vessel *Shin-Miyagi Maru*. During the research cruise, a total of 1,000 tropical tuna individuals (892 bigeye: 49 -109 cm FL, 34 yellowfin: 48 -65 cm FL and 74 skipjack: 40 -61 cm FL) were tagged and released including 28 archival and 3 pop up tagging for bigeye. Also, six yellowfin tuna were tagged and released during the previous cruise of *Shin-Miyagi Maru*. Pop-up tagging of yellowfin tuna caught by longliner was also conducted this year. Ten yellowfin tuna individuals (111 -142 cm FL) were released with pop-up tag in the area south of Kyushu (around 29°N, 130°E) between June and July 2008.

1. Introduction

Tagging is very important and useful for the stock assessment studies of tunas by estimating migration and behavior, natural mortality and growth. Recently, large scale tagging programs targeting tropical tunas were conducted in the WCPO around Papua New Guinea (SPC, 2007), around Hawaii (Itano *et. al.*, 2008) and in the central tropical Pacific (Itano, 2008), in which thousands to tens of thousands of fish were tagged and released.

Around Japan, large scale tagging program (national project) targeting tropical tunas (bigeye tuna *Thunnus obesus* and yellowfin tuna *Thunnus albacares*) started in 2000 in the southwestern part of Japan (around Nansei Islands, subtropical area) (Matsumoto *et. al.*, 2007). This area was selected because there are many coastal fisheries (pole and line, trolling and handline) targeting small tropical tunas around anchored floating or underwater FADs and so it is possible to tag and release many fish at one time. By the end of 2006, 2,083 bigeye and 9,155 yellowfin tunas, mainly small fish, were tagged (Matsumoto *et. al.*, 2007). This program is still being continued.

However, most of the fish released in the vicinity of Nansei Islands didn't make long distance movement (Matsumoto *et. al.*, 2007). Most fish stayed around Nansei Islands or moved northeastward, which suggests the relationship with Kuroshio current, but the movement is limited to the area off central Honshu and there are few recaptures in the east of 150°E. Also, it is not clear to which direction the fish move from the area off central Honshu. Bigeye and yellowfin tunas are caught by

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purse seine and pole and line fisheries in this area mainly in summer. Also, the area off central Honshu and north of that area (the area between 30°N and 40°N) is one of the fishing grounds for Japanese longline vessels, and bigeye catch consists mainly of sub-adult fishes and this area is considered as foraging area for this species (Semba *et. al.*, 2007).

To clarify the movement of tropical tunas in the area off central Honshu, feasibility studies of tagging for tropical tunas (mainly bigeye tuna) have been conducted in the area east off central Honshu (middle-latitude area) using the fish caught by pole and line in 2006 and 2007 (Semba et. al., 2007). A certain number of fish (126 bigeye and 4 yellowfin in two years) were tagged and released with conventional tags. Based on these feasibility studies, the first practical study was conducted this year. It was aimed to tag and release more fish with conventional tag as well as electric tags such as archival and pop-up tags in order to clarify the movement and behavior of tropical tunas more in detail.

Also, tagging of bigeye and yellowfin tunas (mainly bigeye tuna) including archival and pop-up tagging caught by longline in the temperate area of Japanese water has been conducted (Semba *et. al.*, 2007). This is also being continued and additional study was conducted this year.

This paper briefly summarizes tagging programs targeting tropical tunas conducted this year in the temperate area of Japanese water.

2. Method

2.1 Tagging of tropical tunas by pole and line

Tagging was conducted during late June to mid July this year. This project was conducted by National Research Institute of Far Seas Fisheries (NRIFSF) and was entrusted to Miyagi Prefecture. The research was conducted during 2008 second cruise of Miyagi Prefecture's fishing research vessel *Shin-Miyagi Maru* in the area off central Honshu between June 24th and July 13th (20 days). The number of research days was 17. One NRIFSF scientist (the first author of this paper) was on board. Fish schools were searched by crew's eyes as well as sonar and fish finder. Also, trolling was conducted during daytime for locating fish school. Searching of schools was conducted almost all day during daytime except when the sea was rough. In principle, the area where there was no fishing vessels (pole and line and purse seine vessels, especially the latter) was searched to avoid short term recapture. The fish were mainly caught by pole and line gear with very minor part by trolling and jigging. In principle, all bigeye and yellowfin tunas caught were tagged and released with dart tags (conventional tag, double tagged, about 2mm in diameter and 15cm long, yellow in color, produced by HallPrint) except for damaged fish. Skipjack tuna *Katsuwonus pelamis* was also tagged and released when possible, but priority was given to bigeye and yellowfin tunas. In addition, archival tag (data storage tag, Lotek LTD-2310, implanted in the abdominal cavity) or pop-up tag (Wildlife Computer, Mk-10 PAT, externally attached under first dorsal fin) was deployed on a part of bigeye tuna.

Small scale tagging was also conducted in the previous cruise (2008 first cruise) of *Shin-Miyagi Maru* (research of albacore *Thunnus alalunga* and skipjack) through the courtesy of the vessel dur-

ing May to June this year. Yellowfin tuna caught by trolling were tagged with conventional tags in the similar area to that of the second (above mentioned) cruise (32-37°N, 143-147°E).

2.2 Pop-up tagging of yellowfin tuna by longliners

Tagging of tropical tunas by longliners in the temperate area of Japanese water has been being conducted by commercial, research and chartered vessels since 2002 (Semba *et. al.*, 2007). This year, pop-up tagging of yellowfin tuna was conducted by commercial longline vessel during mid June to early July in the south off Japan. Only yellowfin tuna was tagged because it was off season for bigeye tuna in the Japanese water. Small to medium size of yellowfin tuna individuals were brought up on the deck of the vessel and pop-up tag (Wildlife Computer Mk-10 PAT or Microwave Telemetry PTT-100) was deployed by crew members. The tags were programmed to pop off 84 to 240 days after release.

3. Results

3.1 Summary of tagging by *Shin-Miyagi Maru*

Tropical tunas in several types of schools (mainly shark associated, whale associated and birds associated schools) were caught and released in the area east off central Honshu (33-36°N, 142-145°E, Fig. 1) during the second cruise of *Shin-Miyagi Maru*. During that cruise, of 17 research days, tagging was successfully conducted for 7 days (between June 25th and July 12th). Table 1 shows summary of the number of tagged fish and Table 2 shows number of fish tagged by fishing day as well as school types found and operated. A total of 892 bigeye (49 -109 cm FL), 34 yellowfin (48 -65 cm FL) and 74 skipjack (40 -61 cm FL) were tagged and released during *Shin-Miyagi Maru* second cruise, of which archival and pop-up tags were deployed on 28 (53 -89 cm FL) and 3 (90 -109 cm FL) bigeye tuna, respectively. Fifteen to 592 fish were tagged in one day. Fig. 2 shows the number and position of tagging for each species. In addition, six yellowfin tuna (53 -60 cm FL) caught by trolling were tagged with dart tags during the first cruise (May to June 2008) of *Shin-Miyagi Maru*.

Length frequencies of tagged fish during the second cruise are shown in Fig. 3. As for bigeye tuna, most fish ranged between 55cm and 65 cm FL with the mode around 55 to 57 cm. Another slight mode was observed around 80cm FL, and there are a few fish larger than 90cm FL. As for yellowfin, most fish ranged between 50 and 60 cm and no fish larger than 66cm were caught. As for both species, the size of the fish was a bit larger than those caught and released around Nansei Islands (southwestern part of Japan, Matsumoto *et. al.*, 2007). As for skipjack, most fish ranged between 43 and 55 cm, and modes were observed around 45cm and 55cm.

3.2 Pop-up tagging of yellowfin tuna by longliners

A total of 10 yellowfin tuna individuals (111 -142 cm FL) were released with pop-up tag in the area south of Kyushu (around 29°N, 130°E) between June 17th and July 4th. Fig. 4 shows position of release and Fig. 5 shows length frequency of the fish tagged.

4. Future outlook of tagging program

These programs, especially tagging by pole and line in the east off Honshu, should be continued.

It is necessary to tag and release more fish in order to clarify the movement of tropical tunas more in detail.

Acknowledgements

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Table 1. Summary of tag release by *Shin-Miyagi Maru* in 2008.

Species	Bigeye tuna			Yellowfin tuna	Skipjack tuna	Total
Tag	Dart tag	Archival tag	Pop-up tag	Dart tag	Dart tag	
1st cruise	0	0	0	6	0	6
2nd cruise	892	28	3	34	74	1,000
Total	892	28	3	40	74	1,006

Table 2. Number of fish tagged and school type during 2008 second cruise of *Shin-Miyagi Maru* by fishing day.

Date	Bigeye tuna	Yellowfin tuna	Skipjack tuna	Total	School type
Jun. 25	21			21	Birds, shark and whale associated
Jul. 03	135		14	149	Birds and shark associated
Jul. 04	146	7	14	167	Birds and shark associated
Jul. 07	3	7	5	15	Birds and shark associated
Jul. 09	23		8	31	Birds and whale associated
Jul. 10			25	25	Birds, shark and whale associated
Jul. 12	564	20	8	592	Birds and shark associated
Total	892	34	74	1,000	

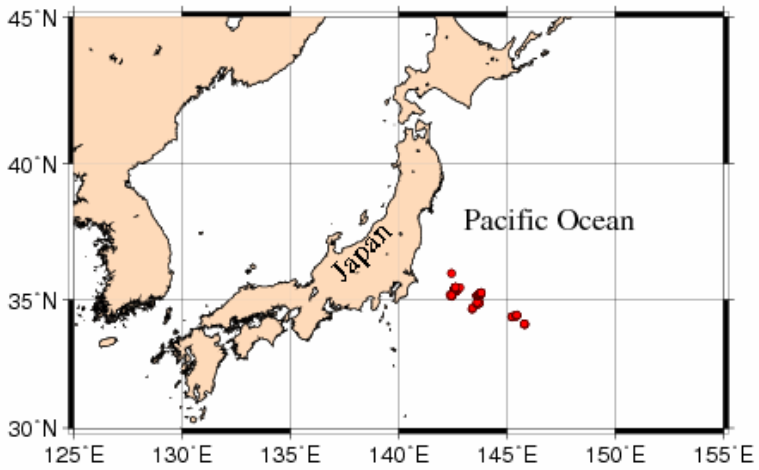

Fig. 1 Position of tag release by 2008 second cruise of *Shin-Miyagi Maru*.

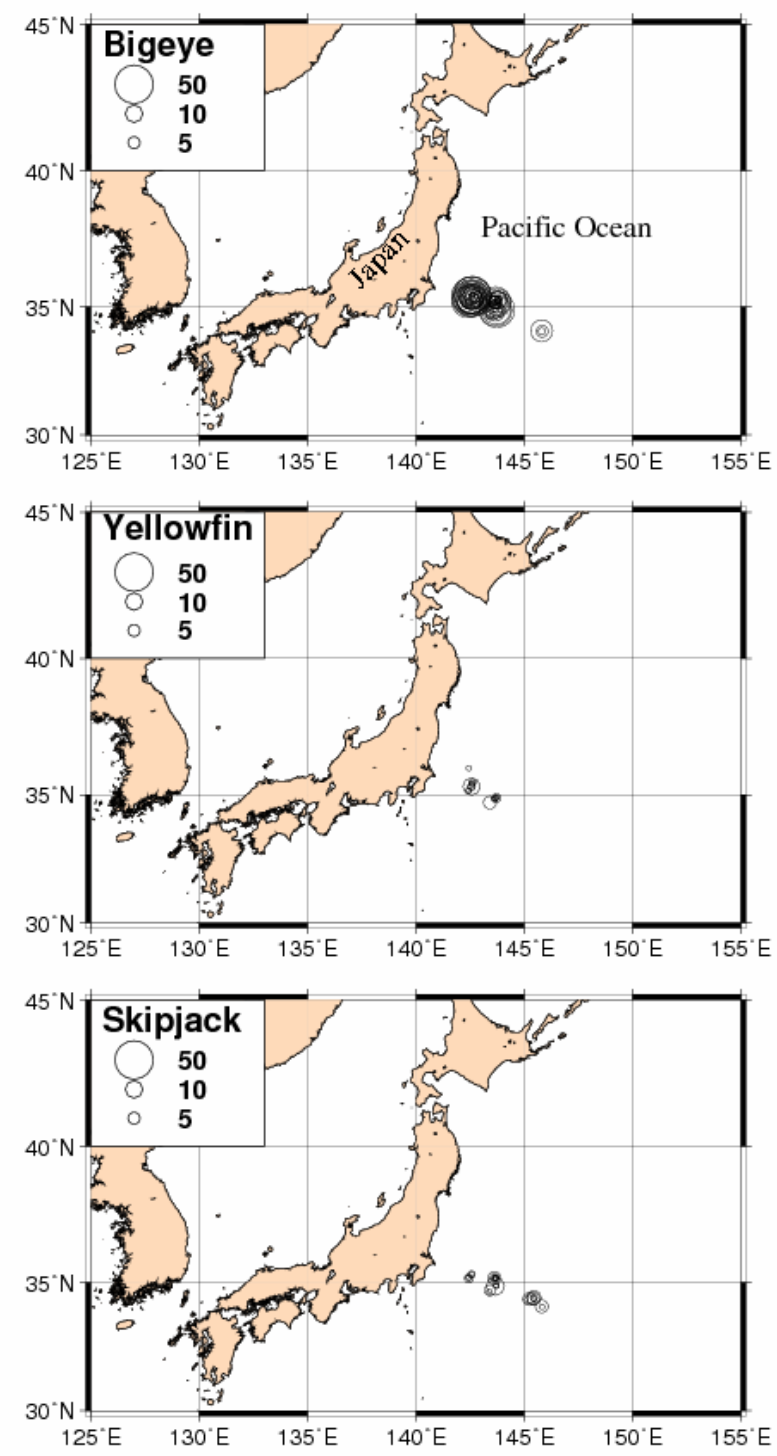

Fig. 2 Position and number of tag and release by 2008 second cruise of *Shin-Miyagi Maru*. Top: bigeye, middle: yellowfin, bottom: skipjack.

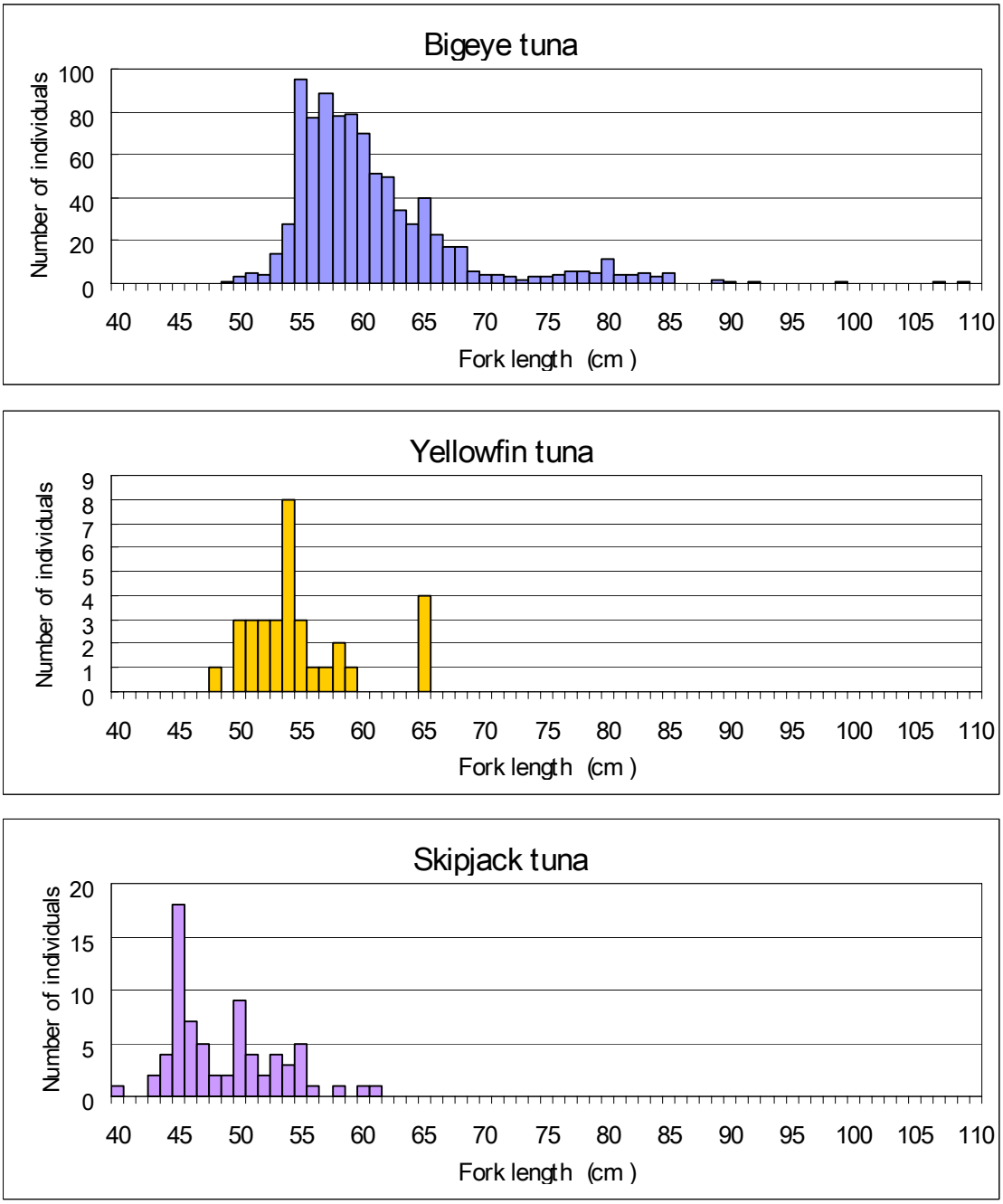

Fig. 3 Length frequency of tagged and released fish (*Shin-Miyagi Maru* second cruise).

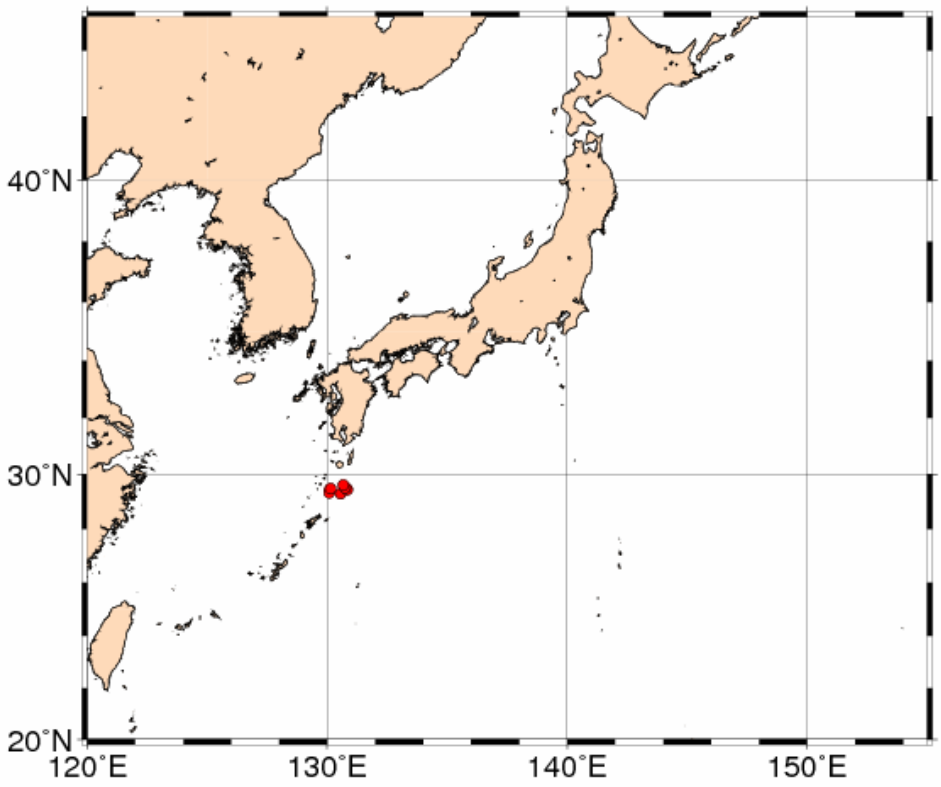

Fig. 4. Position of pop-up tagging of yellowfin tuna in 2008 by longline vessel.

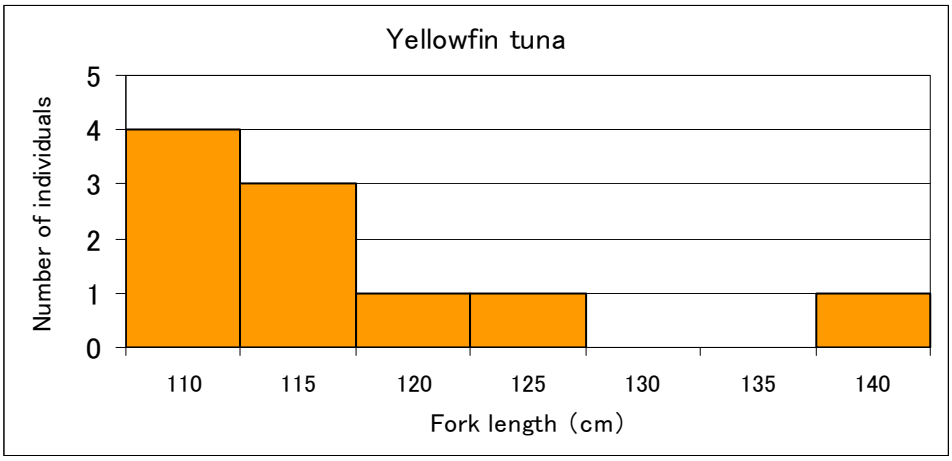

Fig. 5. Length frequency of yellowfin tuna tagged with pop-up tag by longline vessel.