



Shark Tagging Update



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Welcome to the latest edition of the *Shark Tagging Update*. Despite the loss of the Shark Tagging Program and a dwindling number of volunteer taggers, we had a pretty good shark tagging year. We had three exciting returns from Japan, and an unattached tag traveled from Santa Cruz to Redondo Beach. The National Marine Fisheries Service also conducted their annual shark tagging survey, and the Highly Migratory Fisheries Management Plan was finally adopted by the Pacific Fisheries Management Council.

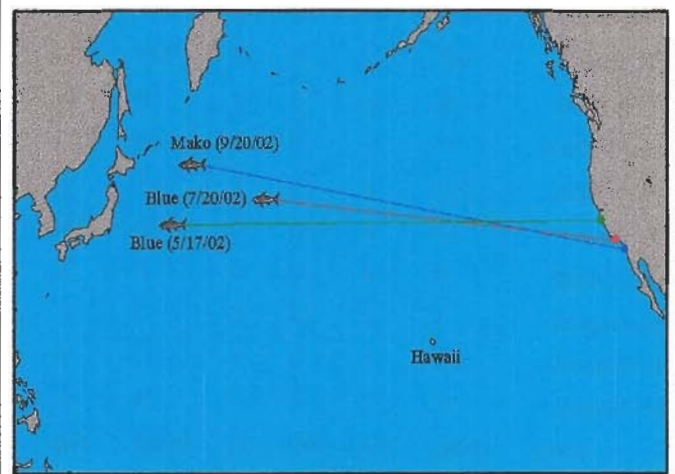
Currently, we have approximately 100 large 'SH' and 205 small 'JS' tags left. If you would like to tag sharks less than 3 feet, please contact me, and I will issue you some of our 'JS' tags. Our large 'SH' tags should only be used on sharks greater than 3 feet in total length. Please remember that the 25 tag limit is still in place. If our database shows that you have more than 25 outstanding tags (this includes both 'JS' and 'SH' tags), I will not issue you any more tags until we have received the tag cards in the mail. If any tags were lost, please notify me immediately so I can update the database. The Department will continue to maintain the historical database and receive all tagging and recapture data.

This update is dedicated to all of our volunteer taggers who stuck with us this past year. Thank you all for your time, effort, and support. Please keep tagging and keep up the good work!

-Valerie Taylor, Marine Biologist



LONG DISTANCE SHARK RETURNS!



Three tags were returned by Japanese longline fishermen in 2002. The first tag belonged to a blue shark that was tagged near Santa Cruz, California. It was caught on May 17, 2002, by *No. 5 Fukuyo Maru*, less than 600 nm from the Japanese coastline. It traveled approximately 4,102 nm and was at liberty for almost two years. The second tag return was also from a blue shark. This shark was tagged near Redondo Beach, California. It was caught on July 20, 2002, by *No. 5 Tokuju Maru*. The shark traveled approximately 3,459 nm and was at liberty for over two years. Shortly after this return, another tag was sent from Japan. This tag belonged to a mako shark tagged near San Diego, California. It was caught on September 20, 2002, by *No. 57 Yuki Maru*. It was at liberty for less than one-and-a-half years and traveled 4,106 nm.

2002 TAGGING OVERVIEW

This year 16 active volunteers tagged 91 sharks, helping to bring the total to more than 11,600 sharks (Table 1). Five species of shark were tagged: blue shark (*Prionace glauca*), shortfin mako shark (*Isurus oxyrinchus*), thresher shark (*Alopias vulpinus*), leopard shark (*Triakis semifasciata*),

and sevengill shark (*Notorynchus maculatus*). Twelve tagged sharks were recaptured in 2002, bringing the recapture total to 230. The recaptures consisted of three blue sharks, seven mako sharks, one leopard shark, and one sevengill shark (Table 1).

Table 1. Summary of tagged (T) and recaptured (R) sharks, 1983-2002 (includes sharks tagged by CDFG and NMFS biologists).

	1983-2001		2002*		Total	
	T	R	T	R	T	R
Blue Shark	7832	62	93	3	7925	65
Shortfin Mako	2931	134	102	7	3033	141
Thresher Shark	149	6	4	0	153	6
Angel Shark	107	6	0	0	107	6
Basking Shark	58	0	0	0	58	0
Sevengill Shark	75	6	7	1	82	7
Leopard Shark	132	4	13	1	145	5
White Shark	53	0	0	0	53	0
Soupin Shark	7	0	0	0	7	0
Spiny Dogfish	5	0	0	0	5	0
Smoothhounds	3	0	0	0	3	0
Other Species	30	0	0	0	30	0
Total:	11382	218	219	12	11601	230

*2002 preliminary data

SHARK MOVEMENTS

MAKO SHARKS

Of the seven mako sharks recaptured this year, four were recaptured in the Southern California Bight, within 35 nm of their tagging positions. All of these sharks were at liberty for less than a year.

The most impressive mako shark return this year was the shark caught by *No. 57 Yuki Maru* (see front page for details). The total length of the shark was approximately 4 ½ feet at the time of tagging and recapture. The sex of the shark was unknown.

The two remaining sharks were recaptured off Baja California, Mexico. Both were tagged near Redondo Beach, California. The first shark traveled 356 nm and was at liberty for over two years (Figure 1). The second shark was recaptured southwest of Bahia Magdalena, 650 nm from its point of release. It was at liberty for less than one year (Figure 1). Both sharks were male.

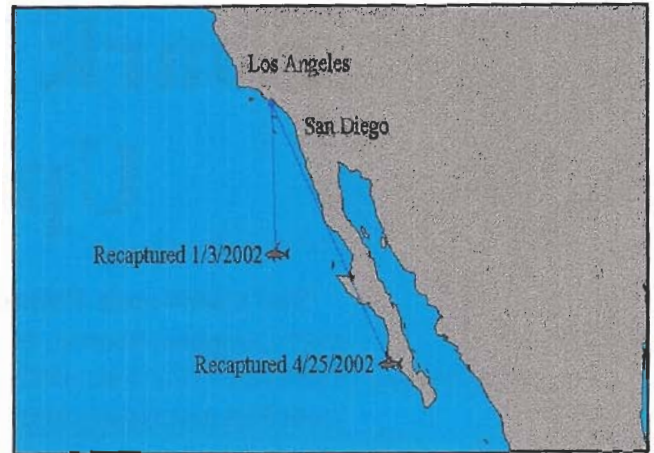


Figure 1

BLUE SHARKS

Three blue sharks were recaptured in 2002. The first two were caught by Japanese fishing vessels *No. 8 Fukuyo Maru* and *No. 5 Tokuju Maru* (see front page for details). Both sharks grew approximately 1 ½ feet while at liberty. The third shark was tagged on June 9, 2001, near the oil platforms off Huntington Beach, California. It was recaptured off Baja California, Mexico, 136 nm from its tagging position. The shark was at liberty for less than a year-and-a-half. (Figure 2). All three sharks were male.

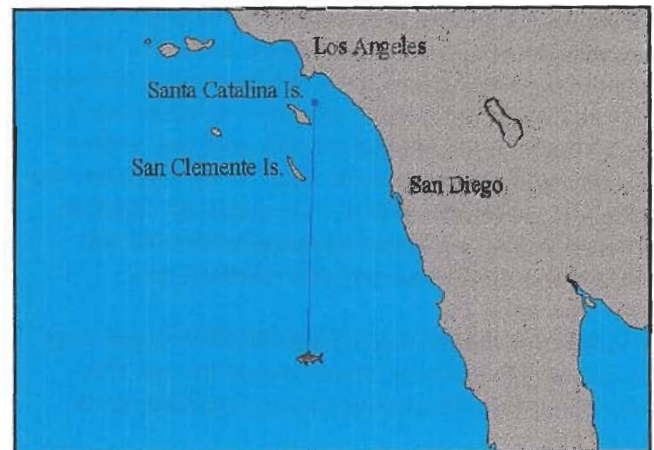


Figure 2

LEOPARD SHARKS

One leopard shark was recaptured this year. It was tagged and recaptured within the San Francisco Bay. It was at liberty for over two-and-a-half years and traveled less than 10 nm from its tagging position.

SEVENGILL SHARKS

One sevengill shark was recaptured this year. It was tagged and recaptured within the San Francisco Bay. It was at liberty for less than six months.

2002 SHARK TAGGERS

The following shark taggers volunteered their time, effort, and expenses to help use up the Department of Fish and Game's shark tags this year. All of their efforts are greatly appreciated.

Howard Arnold	Wayne Kelly
Joe Bairian	Mike McGill
Jason Blower	Donald Nelson
David Brackman	John O'Cain
Donald Bragg	Keith Poe
Jeff Chinn	Deana Poe
Manny Ezcurra	Steve Prime
Walter Heim	Debbie Prime
Guy Irwin	

The Department would also like to thank the following agencies and institutions for their continued cooperation and time:

Monterey Bay Aquarium, Aquarum of the Bay, and the National Marine Fisheries Service.

The Department would also like to thank **Kuni Fukuma** for volunteering her time to help translate several letters into Japanese. It was greatly appreciated.

TAG TALES

On November 1, 2002, one of our CDFG shark tags was found on Redondo Beach. The tag was never attached to a shark and was reported as lost on October 19, 2000, near Santa Cruz, California. We don't know how long the tag had been on the beach, but it held up pretty well despite its long journey with the ocean currents.

NMFS SHARK TAGGING ACTIVITIES

Juvenile Shark Survey:

The National Marine Fisheries Service (NMFS) conducted their annual shark tagging cruise aboard the *R/V David Starr Jordan* in June and July of this year. The Southwest Fishery Science Center and the Department initiated the juvenile shark abundance survey in 1994 to track changes in relative abundance of juvenile sharks within the Southern California Bight. The survey is conducted annually and is based on historical records of the California longline shark fishery (1988 to 1991).

In total, 119 mako, 2 thresher, and 73 blue sharks were captured using longline gear. Of those, 163 sharks were tagged, and 101 were injected with oxytetracycline for age and growth studies. In addition, 93 DNA samples were taken and 55 blood samples were obtained for condition and post release survival studies.

Catch and catch-per-unit of effort (CPUE) for the shortfin mako declined from 1.01 sharks per 100 hook-hours in 1994 to 0.23 in 2000; mako shark CPUE increased in 2001 and 2002 (Figure 3). The overall decline in mako shark CPUE, however, is statistically significant ($\alpha=0.05$) over the study period.

The catch and CPUE for the blue shark ranged between 0.80 in 1994 and 5.14 in 2000. The blue shark CPUE did not indicate any significant trend (Figure 3).

Mean total lengths for shortfin mako sharks changed little over the nine year survey period although considerable variance occurred between years (Figure 4). Mean total lengths of blue sharks decreased (Figure 4).

The declining trend in CPUE for mako sharks and the declining length frequency of blue sharks are a concern. While there are a number of reasons to explain the decline, no obvious cause(s) currently presents itself. It is encouraging, however, that blue shark CPUE and mako length frequencies have stabilized in recent years.

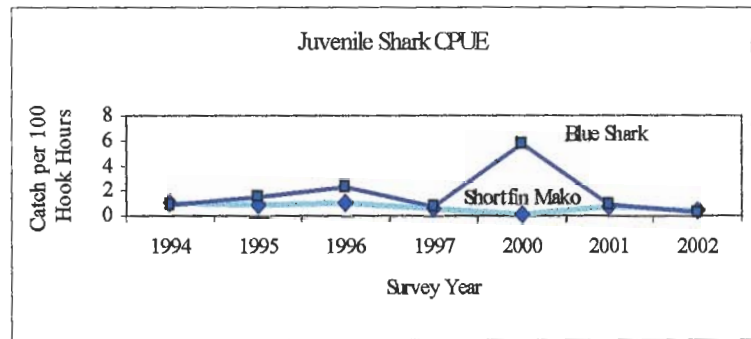


Figure 3

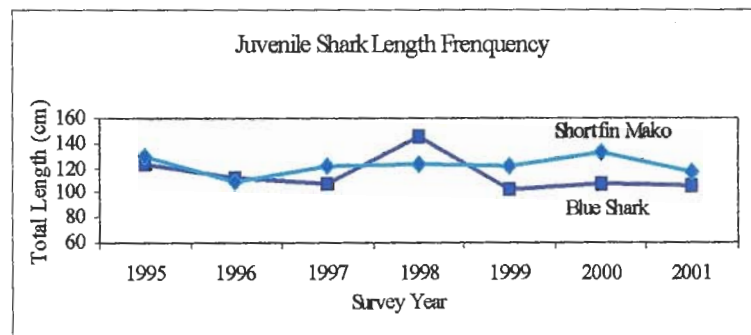


Figure 4

Satellite Tagging of Mako Sharks:

During the 2002 Shark Tagging Survey, 8 mako sharks were fitted with data archiving satellite reporting tags to identify habitat, migration patterns, and survival rates after release. These tags were programmed to release from the host fish and transmit depth, water temperature, and light intensity data via satellite to researchers. Four tags were programmed to release after 60 days, and four were programmed to release after 120 days.

The largest mako tagged was 9 feet long and weighed approximately 500 pounds. It moved only a net distance of 11 miles. Five of the mako sharks stayed in the area off southern California while three moved south and east off Baja California, Mexico. The longest movement by one of these mako sharks was 492 nm in only 60 days.

The satellite tags indicated that mako sharks preferred to remain in water temperatures between 59° and 66°F but will go into colder water during deep dives. One of the mako sharks descended to nearly 1,500 feet where the water temperature was 44°F. Generally, they remained in the surface waters above 100 feet.

This data has provided much insight into the habitat and movement patterns of mako sharks off southern California. It also shows that mako sharks are hearty and survive the

tagging experience when carefully tagged and released (-Dave Holts, NMFS).

HMS FMP UPDATE

On October 29, 2002, the Pacific Fisheries Management Council (PFMC) adopted the fishery management plan (FMP) for West Coast highly migratory species (HMS) fisheries. The FMP authorizes Council management of tunas, sharks, billfish, and dorado. Key provisions include:

- Prohibiting the use of pelagic longline gear within the U.S. Exclusive Economic Zone (EEZ);
- Defining legal drift gillnet gear as having a minimum stretched mesh size of 14 inches;
- Applying certain restrictions on West Coast-based longline fishing vessels operating outside the U.S. EEZ;
- Requiring permits for commercial and commercial passenger fishing vessels.

The HMS Plan Development Team will work with contracted staff, Council staff, and the MNFS Southwest Region to finalize the FMP for submission to the Secretary of Commerce. For more information on the HMS FMP, go to the Council website at www.pcouncil.org.