

Mark - Recovery Studies on Fish

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Fish is sometimes scarce and very dear and at other times plentiful leading to glut. Their catches fluctuate not only from year to year but also from place to place.

Marine fish landings in our country, consist of a variety of them. The oil sardine, mackerel, anchovies, prawns, tuna, seer fishes, pomfret, threadfin bream, cat fish, and shark are some of the popular items. But they are not caught throughout the year. Each variety has a season of its own restricted to a few months.

MIGRATION LEADS TO SEASONAL FISHERIES

The seasonal occurrence of a fishery is linked first with the migratory habit of the fish. Fishes like tuna and shark can swim fast and travel far and wide. Others like prawns which do not move fast are often carried from place to place by currents. The environment thus has an important part to play in the seasonal occurrence of fish.

FACTORS GOVERNING SUCCESSFUL FISHERY

The success of the fishery in a season depends upon the availability of the fish in the fishing area vulnerable for capture. The magnitude of the catch in turn is governed also by the density of the population and the growth, size and age of the fish. These characteristics under the influence of the dynamics of the water in which the

fish lives, change from time to time. A knowledge of them therefore is imperative for the management of fisheries. But to get at it is not that easy.

MARK - RECOVERY TO SECURE DATA

The method adopted mostly for it is a close monitoring of the fish catches that are landed. From the trends in catches, effort put in to harvest them, and the biological conditions of the fish, all required information of the fish and their population can be worked out by scientists. These investigations, however, centre around inferences and are circuitous and indirect. A direct approach to the problem is the mark-recovery studies called tagging.

In tagging, live fish are individually marked appropriately and released back indexed with date and place of release. When such fishes are recaptured, they provide valuable data on migration, dispersal, rate of growth and changes in the population structure such as on density and abundance. This in turn will assist assessment of stock and estimation of fishery potential.

GENESIS OF MARKING METHOD

Marking of fish was probably first attempted a few centuries ago by wealthy landowners who wished to retain title to the fish living in streams and rivers flowing through their land. As early as 1863, tagging salmon with strips of red silk cloth tied round their caudal

peduncle was attempted in order to follow the movements of individual fish. The first successful marking of a marine fish was conducted in 1893. Soon after the turn of the century spiny lobsters were tagged for the first time. Since then tagging has become one of the most important means available to fishery scientists for the determination of migration and dispersal, growth, population size, and finally mortality and recruitment of both finfish and shellfish populations.

TAGGING HISTORY IN INDIA

In India, tagging was successfully attempted for the first time on **hilsa** in Hoogly estuary in 1959. Subsequently grey mullets and other brackishwater fishes were tagged in Chilka Lake in the same year. Experimental and preliminary tagging on marine fish was carried out for the first time during 1965-66 at Mangalore and Karwar by the Central Marine Fisheries Research Institute (CMFRI). The Institute conducted tagging experiments on lobster at Muttom, south of Vizhinjam in Kerala in March 1965 and 1966.

Encouraged by the results of the above experiments, CMFRI took up tagging of oil sardine and mackerel at Karwar, Mangalore and Cochin in 1966-67. This created considerable interest and a Committee on National Tagging met at Hyderabad in 1967. As per the recommendation, a demonstration-cum-training programme was organised by CMFRI at Cochin in September-October

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ber 1967 where officers of State Fisheries Departments were also included. Subsequently, CMFRI took up tagging at many places like Karwar, Mangalore, Cannanore, Calicut, Cochin and Vizhinjam in west coast and Mandapam and Waltair in east coast during 1967-68 and 1968-69. Thousands of oil sardine and mackerel were tagged and released during these 3 years. Recoveries from this were either local or from nearby places. It was 90 km away at the farthest for oil sardine and 55 km for mackerel. The oil sardine and mackerel were at freedom after tagging for 70 and 25 days respectively. The longest period for mackerel at liberty in this study was 50 days, but it was caught only 28 km away from the place of release. CMFRI in 1972-73 tagged and released a few thousand penaeid prawn at Goa, Cochin and Madras and found them not to move far from the grounds except one 'Kadal shrimp' released at Goa was caught 60 km away 10 days after release.

INTENSIFIED TAGGING WORK

The work on mark-release was revived with more vigour in January 1976 under the National Tagging Programme. Since then, the number of oil sardine and prawns tagged and released run into many thousands.

MIGRATION OF PRAWNS

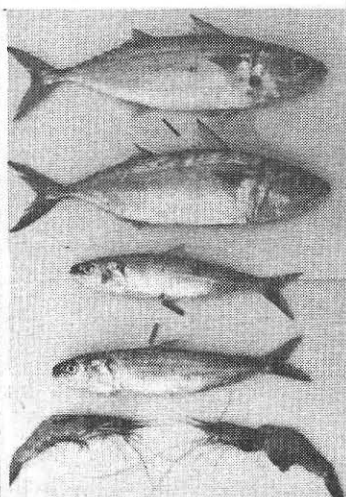
Recapture of tagged fish and prawns has generally been local. But we had important information on prawn migration in the course of this work. Eight Indian white prawns tagged and released in the shipping channel of Cochin Harbour travelled long distances round Kanyakumari in 2 to 3 months to Tamilnadu coast of Gulf of Mannar in east coast. The distance

covered in their sojourn ranged between 220 and 380 km, at respective average speed per day of 2.93 and 5.58 km.

TIME AND DISTANCE

Compared to the 314 km journey of a tagged shrimp in Texas, U.S.A. this is significant. But an American white shrimp surpassed it and moved a distance of 580 km along Cape Kennedy. A prawn tagged and released by CMFRI at Calicut, however, exceeded this and travelled 628 km down south before its recapture at Overi in east coast in Tamilnadu taking 149 days to cover the distance. The journey of 1333 km by a king prawn in Australia, nevertheless has set the record in distance crossed by a tagged specimen. Incidentally it took only 184 days to cover this track. A prawn from Calicut, on the other hand leads in time as it took 213 days to go 184 km southwards before getting caught again.

Experiments of tagging on rock lobster at Muttom showed their movements to be highly local between



Fish and prawns marked with different types of tags

one fourth and 7 km. But most of them were recaptured after 200-250 days. One was caught 12 km away from the place of release after 246 days. Yet another one was at freedom for 615 days before finding its way into the fishing trap half km away from the place of release.

Record time and distance, however, are with finfish. One tagged halibut caught in California took a tour of 3680 km in 6 years. A striped bass lived 18 years and 7 months after tagging, say the California Fish and Game Scientists. A skipjack tuna tagged by Inter-American Tropical Tuna Commission off California travelled 4400 km in 14 months and appeared near Honolulu in Hawaii. **INFLUENCE OF CURRENTS ON MOVEMENT**

Some tagged prawns have moved incredibly long distances. Prawns, as already stated, are not great swimmers and hence could have been transported these distances by currents or coastal drifts. CMFRI therefore took up release of bottles to understand the coastal drifts. Four bottles released at Calicut in April 1984 reached the west coast of Sri Lanka by July of same year. Similarly bottles released at Madras in September 1985 were later found dispersed along the southern coast of Tamil Nadu and one of them reached the shore of Sri Lanka. Another bottle of this lot was recovered from Mogadisho in Somali coast of Africa after 174 days indicating the bottle to have drifted southwards towards Sri Lanka coast, around the Peninsula, went upwards along the west coast of India and then moved westwards and southwestwards to Somali coast along with the prevailing surface currents of Bay of Bengal and Arabian

Sea. The currents may thus play a vital role in the distribution of fish and prawns in the sea.

'EARMARKING'

Many of us may not have bothered about the etymology of the word 'earmark' in English. According to the dictionary, it is 'an owner's mark set on the ears of sheep for identification'. In the same way fish are also marked by clipping off fin, punching hole or cutting design on it. In case of prawns and lobsters an eye may be removed to mark them. These are the types of tagging falling in line with 'earmarking'. Tattooing and hot and cold branding are some other ways. Colour markings with dyes through external application, internal administration along with feed, or injections are used on many occasions. Use of fluorescent pigments adds to viability and easy detection of marked fish or prawn.

Migration of birds is well known. Metal rings put on their legs are very effective identification marks in that study. Similarly tagging fish with some material is most popular now. Tags in the 19th century were made of silver and platinum to avoid corrosion. In the study of salmon, tags made out of iron were used to the advantage that they will get stuck in the magnetic fields on conveyor belts through which they pass in fish processing units. But a variety of tags made mostly of plastic or polyethylene are in vogue at present.

SPEED AND COURSE THROUGH SOUND SIGNALS

Sonar and ultrasonic transmitters are also used. Signals from them are picked by receivers to detect the speed and actual course of migration.

Studies on migration and identification of population for assessment need only some marking of general nature listed above. When studies on growth are involved, each tag has to be numbered and information at least on length of fish/prawn/lobster tagged with it has to be recorded. On recapture they can be referred back and increments in length, showing rate of growth and providing data for age determination, noted.

A tagged specimen will look adorned externally with a numbered plastic tag of some suitable colour either on its cheek, back, belly or tail firmly attached with least injury and inconvenience to it. Use of internal metal tags are practical only with detectors or magnetic conveyors and practical only when the entire catch comes through processing units or reduction factories.

SELECTION OF TAGS-PRECAUTIONS

Great care has to be taken in the selection of tag for mark-release studies. The tag should be light in weight and not a burden on the fish. It should not be injurious to the body and inconvenience mobility. The tag should be eye-catching for recovery purpose but not betraying them to predators. It should not cause the tagged ones ostracism. The tag should neither fall off in course of time nor wear off. The dyes fade and radiotransmitters lose contact or become weak. Metal is heavy and corrosive. Plastic is hence the best suited. It is cheap and being available in a variety of colours, shapes and types is easy to select according to the size, shape, colour, habit, and habitat of the fish or shellfish which needs to be tagged.

IMPORTANCE OF RECOVERY

The success of tagging programme, however, depends not on release alone. It hinges on the recovery programmes that follow the mark-release. Wide publicity through media like hand-outs, wall-posters, news items in dailies, radio announcements, telecasts, and screening of slides in cinema theaters, educating the fishermen and the public on importance of tagging, keeping them informed of the release of tagged items, and inculcating responsibility to return the recaptured tagged ones, are some of the methods adopted to improve the results of recovery. Along with this building up of awareness, cash incentives for the return of recovered specimens with tag and data on the date and place of its capture, are offered. If only the tag alone is available after recovery, it will not provide the valuable data for growth and age determination. Nevertheless, such tags should also be passed on to the scientists with relevant data for a reward.

PROGRAMMES

According to the programmes, fishes and prawns will be tagged and released periodically from many centres along Indian coasts in hundreds and thousands of numbers. But the success rests mainly on the response of the public, especially the fishermen.

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**FISHING CHIMES ALWAYS
AT THE SERVICE OF
ITS READERS**

