

2000+ UK Shark Tagging Program: An Angler Led Shark-tagging Initiative in UK Coastal Waters

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Abstract

The "2000+ UK Shark tagging program" was originally developed by anglers in order to better understand the distribution and behaviour of their target species. By September 2002, 220 volunteer taggers measured, weighed and tagged 2 374 sharks. Despite limited funding, this program is beginning to provide data on distributions, movement rates and behaviour, and has developed a length-girth-weight chart that allows anglers to estimate the weight of their catch without killing them. The program is helping to promote the image of sea anglers both to the public and amongst themselves as being "conservation conscious".

Key words: angling, conservation, shark-tagging

Introduction

Fisheries research programs are usually driven by the need for knowledge that will facilitate sustainable exploitation of a species' population. This has resulted in a long history of research on commercially important species such as cod, tuna, mackerel and herring. It is only in the last few years that substantial research effort has been directed towards understanding the effects fisheries can have on non-target species (Jennings *et al.*, 2001), and an appreciation has been gained of the huge ecological changes that have been caused by anthropogenic activities (Jackson *et al.*, 2001). Elasmobranchs, with their relatively large size at maturity, slow growth rates and low reproductive outputs, are likely to be particularly vulnerable to exploitation (Musick *et al.*, 2000). Given the extensive geographic ranges of many shark species, the lack of knowledge of their basic biology and uncertainty over how their populations are reacting to environmental changes in many areas, there is seldom sufficient information to enable management decisions other than "proceed with extreme caution" to be made (Hurley, 1998; Musick *et al.*, 2000).

There have been relatively few formal studies of shark populations within UK waters (Holden, 1965, 1968; Stevens, 1976, 1990; Gauld, MS 1989; Vas, 1990; Henderson *et al.*, 2001). Reasons for this include the low commercial

value of sharks, (catches of which are often unreported or discarded), the high cost of dedicated shark sampling using research vessels, and the low priority of sharks in the pecking order of fisheries management. Anecdotal information of shark movements and behaviour has existed amongst the UK sea-angling community for many years (e.g. Caunter, 1961), but complicated internal angling politics, their simplistic (and often jingoistic) views of fisheries management, and a general lack of confidence in data collected by anglers by the UK institutions responsible for fisheries science, have often made collaboration between anglers and fisheries managers or scientists extremely difficult. However, concern amongst sea anglers over declining catches and the small size of many fish captured has resulted in some anglers approaching researchers and fisheries managers for help. There is also a greater realisation amongst academics and fishery managers that data and anecdotal evidence from commercial fishers (Johannes *et al.*, 2000) and angling organisations (Lucy and Davy, 2000), along with other non-traditional sources of data (Pauly *et al.*, 1998), may play an important role in fisheries management. The growing desire amongst anglers to be viewed as being 'conservation conscious' rather than blood-sport enthusiasts has resulted in support for initiatives that promote a positive image of anglers and strengthen this claim (e.g. the British Conger Club and Mullet Club catch and release programs).

A recent review of 64 shark-tagging schemes around the world showed that they were initiated by researchers who either had to catch and tag fish themselves or persuade anglers to assist them (Kohler and Turner, 2001). The 2000+ UK Shark Tagging Program differs from these programs, being initiated and led by anglers rather than by scientists. In this note we discuss the aims, the history and development of this initiative, and show that it can provide a valuable source of information for the study of shark species.

Methodology

Development of the program

The 2000+ UK Shark Tagging program used recreational anglers around the whole of the UK as the primary tagging resource. A preliminary study of shark angling behaviour showed a catch and release rate of almost 99.9% for some species such as tope (*Galeorhinus galeus*), and lower (but still high) percentage for others such as smooth hounds (*Mustelus* spp.). Clearly, some shark species are regarded as 'sport-only' by many recreational sea anglers and this became the foundation stone for the establishment of a tagging program. The aims of the program were primarily to increase understanding of eight elasmobranch species targeted by UK recreational anglers, focussed on collecting morphometric data and developing an understanding of seasonal distributions and sea areas that are likely to be important to shark populations at key stages in their life histories.

A pilot study was carried out in 1998–99, to establish the practicalities and acceptability of tags and tagging methods to anglers, their willingness to tag and data recording systems. The skippers of 8 angling charter boats from one harbour association considered that Floy dart tags FT–1 were acceptable for use with tope and smooth hounds, the species they encountered most frequently. Using experience from programs that were utilising similar tags on sharks (New Zealand and Australia) (John Stevens, pers. comm.), Floy FT–69 tags were issued to some taggers that were specifically targeting larger species, such as porbeagle (*Lamna nasus*) and blue shark (*Prionace glauca*), whose thicker skin cause the barbs on the FT–1 tags to shear.

Having developed field protocols, evaluated tag types and a willingness of anglers to tag sharks, a working program spread over 3 years was developed, and funding obtained from organisations that would be acceptable to anglers – the World Wildlife Fund for Nature (UK) and the Angling Trades Association. Recruitment of anglers to the tagging program was initially undertaken by advertis-

ing through the main UK sea angling publications (Sea Angler, Total Sea Fishing, Boat Fishing Monthly, Angling Times) towards the end of 1999. Further publicity was provided through word of mouth, the program's own web site (<http://www.ukshark.co.uk>), magazine, radio and television coverage.

Anglers interested in participating in the program were required to complete an application form detailing the areas fished, species likely to be encountered and whether they fish from charter boats, private boats or the shore. Some 220 taggers participated in 2000 and 2001 to whom tagging kits, report cards and comprehensive instructions for tagging were issued. Although most anglers involved in the program fish from the shore, some fish from boats well offshore for pelagic species such as blue (*Prionace glauca*) and porbeagle sharks (*Lamna nasus*) (Fig. 1).

Participants in the program are provided with newsletters: the winter edition dealing primarily with events that have taken place over the previous 6 months and the summer edition giving a brief outline and breakdown of the data gained over the preceding 12 months. This information keeps taggers appraised of the tagging effort of all program members and shows the distribution of the sharks that have been tagged, together with details of recaptures. These newsletters are posted on the web site and the information is therefore available to a wide and varied audience.

Tagging methodology

A canula system is used to insert barbed Floy FT–1 or Floy FT–69 tags (depending on shark size) in the dorsal musculature, using a tagging pole to make insertion of the tag easier and minimise damage to the fish. Care for the captured sharks is an overriding factor in all the tagging operations, and handling protocols were in part already in place, due to the sport fishing ethic that was applied especially to tope. These led to landing nets being used for species up to 1.8 m long, the use of hoods to effect a calming behaviour, and weighing slings specifically designed for sharks. Experienced charter skippers have developed working procedures in which the shark is only onboard for between 2 and 3 minutes, from netting to release, tagged and measured. Larger sharks are tagged whilst partially immersed in water alongside the boat to avoid potential damage to the fish from unsupported removal from the water, and are measured against pre-measured lines along the boat hull. A code of best shark angling practice is also sent out with each tagging kit, which promotes both the use of circle hooks or plain painted hooks to avoid deep hooking, thus reducing the potential for internal damage

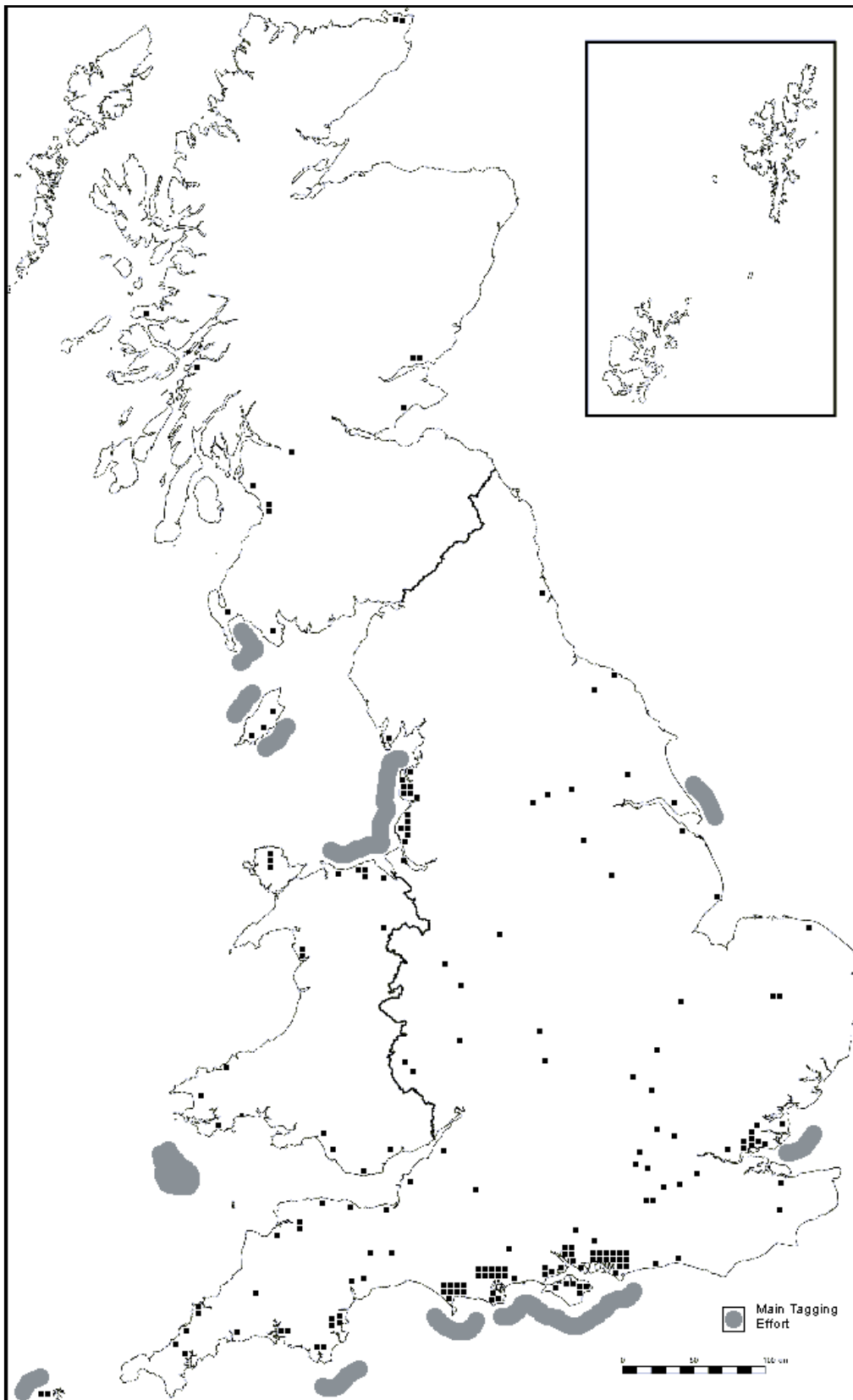


Fig. 1. The distribution of anglers (town of residence) participating in the UK shark tagging program, and sea areas where main tagging effort took place 2000–2002.

to the fish. This concept has been adopted by the angling press and promoted widely.

The report card (Fig. 2) was developed during the pilot study with the anglers and their working environment in mind. Tick-boxes facilitate speedy tagging, which may be especially important on a sports charter boat with up to 12 anglers, where nearly all the anglers will catch fish when a 'pack' or 'school' of sharks moves through. The tagging data record requests a note on the condition of the fish upon return to the water and pictures of unusual markings, damage or other features. The growing spread of computers and digital cameras is proving to be valuable, allowing pictures to get e-mailed back to the organisers by email within hours of the tagging event.

Generally, species identification has not been a problem, as anglers are knowledgeable about their target species group. The program web site provided pictorial and 'lay' descriptions of each species expected, with diagnostic features and possibilities for mis-identification; for example, the white or light patch on the rear of the first dorsal of a porbeagle shark, which is absent on a mako shark (*Isurus oxyrinchus*).

Administration of the program

Completed tagging cards are requested from the taggers on a six-monthly basis, or whenever they start to run short of their allocated tags. The program administrators collate tagged fish data, deal with recaptures, update the website and produce press releases, preliminary data analysis and newsletters. Marine biologists have been recruited to help further evaluate and analyse the data.

Reports of recaptures come for a number of sources, mainly in response to posters distributed to commercial fishing ports in UK and Europe, and repeat press releases to appropriate publications. All captors are requested to provide tag number, date, species, location and weight, and information on distance travelled, confirmation of species identification, time elapsed since tagging and growth are forwarded to the captor, along with a five Euro reward. The original tagger is informed of the recapture, and awarded a "2000+ UK Shark tagging cap".

Results

In the two years to September 2002, 220 taggers tagged 2374 sharks of five species (Table 1). Twenty of




 UK SHARK TAGGING PROGRAM 		TAG NUMBER:	Completed forms to go to Sue and Jeri Drake 48 Woodbridge Avenue Leatherhead Surrey KT22 7QN - 01372 386276 tag@ukshark.co.uk	
		SPECIES: Tope Starry Smooth Hound <input type="checkbox"/> Common Smooth Hound <input type="checkbox"/> Thresher Shark <input type="checkbox"/> Porbeagle Shark <input type="checkbox"/> Short Fin Mako Shark <input type="checkbox"/> Angel Shark (Monkfish) <input type="checkbox"/> Smooth Hammerhead <input type="checkbox"/> Blue Shark <input type="checkbox"/>	Sex: Male <input type="checkbox"/> Female <input type="checkbox"/> Unknown <input type="checkbox"/>	Comments:
Condition of Fish: Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> Gravid <input type="checkbox"/> Non Gravid <input type="checkbox"/> Total Length: Fork Length: Girth: Weight: lbs				
Locality in Words:		Weather:		
Lat/Long:		Tide:		
Bottom Structure Sandy <input type="checkbox"/> Rough <input type="checkbox"/> Reef <input type="checkbox"/> Other <input type="checkbox"/>		Depth: Ft		
Date: Time:				
Parasites: Bait Used:				
Tagger/ Anglers Name and Address:				
Charter Boat Name				

Fig. 2. The record card used by the 2000+ UK Shark tagging program. Note that figures are in imperial (pounds and inches) rather than metric.

TABLE 1. The numbers, distribution and species of shark tagged by the 2000+ UK Shark Tagging Program up to September 2002.

Species	Number	Distribution (ICES Divisions)
Tope (<i>Galeorhinus galeus</i>)	1661	VIIa, VIIf, VIIe, VIId, IVc, IVb
Common smooth hound (<i>Mustelus mustelus</i>)	170	VIIe, VIId, VIIf
Starry smooth hound (<i>Mustelus asterias</i>)	412	VIIf, VIIe, VIId, IVc
Blue shark (<i>Prionace glauca</i>)	97	VIIg, VIIf, VIIe
Porbeagle shark (<i>Lamna nasus</i>)	17	VIIf, VIId
Others	14	

these fish have been reported as recaptured: 12 tope, 6 blue shark and 2 smooth hound.

Distribution and movement

The most commonly targeted species is the tope, for which tagging data have been used to generate a picture of its seasonal changes in distribution. In a specific area, for example, large male tope have been found to arrive in late-April, followed by medium-sized and large females until the middle of June, then small males and females through to September or October. In other areas, large fish of both sexes may be present during August. In general, tope are first encountered in the southern UK waters, spreading northwards towards the Scottish waters through spring and summer, with a return migration leading to the last tope being captured off the south English coast during October. Preliminary recapture data suggest that tope may move up to 500 miles each year, compared with 2 000 miles for blue sharks.

Length-weight-girth conversion

Anglers like to know the weight of a captured fish, and may need to confirm their fish's weight in order to claim a record or to compete in competitions. In order to encourage anglers to return fish, tagged or not, a chart based on an analysis of length, girth and weight data collected in the program has been developed for tope, with which anglers can estimate the weight of caught tope from length and girth measurements.

Tide vs catch chart

The feeding behaviour of their target species is of particular interest to anglers, who have long recognised that tope are more likely to be caught at specific states of the tide. The state of the tide for any given station in UK coastal waters at the time each shark was captured can be estimate using a tidal prediction program (NavTides (v2.0) by PC Maritime Ltd, London.). Figure 3 shows that, in the main tagging season 2000, most tope were captured during the 3 hours prior to low water and 1½ hours before high water.

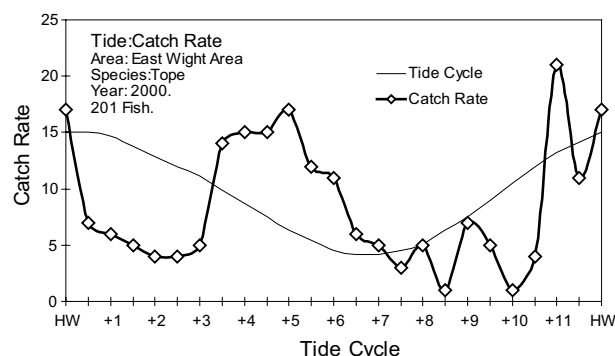


Fig. 3. The relationship between catch rate (index, based on tope caught per angler-hour) and tidal movement for tope tagged in 2000–2002 ($N = 201$) east of the Isle of Wight. The average height range for the area across summer spring and neap tides is 4.5 m.

Discussion

There are many examples of successful teleost and elasmobranch tagging programs in which anglers have collaborated (Lucy and Davy, 2000). However, the 2000+ UK Shark tagging program stands alone in that it has been run by recreational anglers. The main drawback to using volunteer taggers is that we have no control over where and when they fish and thus tagging takes place only when the anglers are fishing for sharks; this can leave some areas thinly sampled. However, the tagging program has had a number of beneficial effects on those carrying out the tagging, giving them a greater regard for 'their' fish and awakening an interest in shark biology and a desire to improve their catch-handling procedures for conservation purposes.

Early in the program, it became evident that feedback of the results from analyses specifically related to the needs of recreational anglers strengthened the working relationship with the taggers. In return, anglers have provided anecdotal field observations which can be used

to develop further focussed research. This has led, for example, to an investigation of a potential pupping and nursery areas used by both starry and common smooth hounds (*M. asterias* and *M. mustelus*) in the east Solent.

A common theme throughout the program is that anglers and charter skippers consider the fish – once tagged – as 'their' fish. They assume a responsibility for the fish and have a vested interest in its welfare. The charter skippers participating in the program reported an increase in bookings for 'tagging' trips rather than 'shark' trips, and skippers subsequently volunteered for the program because potential customers had been seeking opportunities to tag. The participants have an interest in the developing results of the program, since greater knowledge of their target species is likely to improve catches, but they are now equally mindful of the need for catch and release as a conservation tool. Despite the common perception of anglers and fisheries scientists as occupying polarised positions (Connelly *et al.*, 2000), the overall objectives of both may actually be very similar.

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