

Book of Abstracts: 5th Annual Meeting of the European Elasmobranch Association 2001

Wind power and elasmobranchs

Andrew Gill

Abstract:

There is currently a welcome move towards the use of renewable energy sources throughout the world, and for those countries with coastlines eg. Western Europe, offshore wind power represents a valuable resource. The installation of offshore wind turbines requires the transport of electricity between turbines and to the mainland via submarine cabling which in the process produces electromagnetic fields around the cables. Sharks, skates and rays (subclass Elasmobranchii) have long been known to exploit the electric outputs of organisms in saltwater, to detect and capture their prey. Therefore, there exists the potential for electrosensitive species to detect and respond to the electromagnetic fields produced by offshore power installations. In this presentation I will consider the potential effects of electromagnetic fields emanating from undersea cabling associated with wind farms specifically on benthic elasmobranchs. In addition, I will report on a pilot study funded by the Countryside Council for Wales which experimentally demonstrates the response of the dogfish *Scyliorhinus canicula* to electric fields simulating prey and fields simulating the maximum potential output from unburied undersea cables. I will then discuss the possible importance of these findings.

Reproductive effort of *Raja naevus* in Celtic Sea.

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Abstract:

Cuckoo ray (*Raja naevus*) represent 38 to 41% of total French landing of skates and rays. Total annual landing of the French fisheries have been around 4000 tons. This species is the most important landed in France. First investigations on reproduction have shown that the size at maturity in both males and females is approximately 59cm . Females spawn throughout the years without seasonal period (Du Buit, 1976). The aims of this present work were : 1) to describe the spawning strategy ; 2) to define the individual fecundity of the Cuckoo ray in the Celtic Sea

Since October 2000 several rays are collected in the Concarneau's fish market. The following morphometric measurements were made: total length, total weight, length of claspers, weight of liver, weight of gonads, weight and length of nidamental gland. The maturity stages were determined by parameters and methods defined by Stehmann (1995) and Walker (1998). Ovocytes in the ovaries are counted according to diameter into 4 classes (5 to 10mm, 10 to 15mm, 15 to 20mm, >20mm) in order to specify evolution of ovocytes and the rhythm of laying.

The preliminary results confirm the absence of seasonality of reproduction. We can conclude that during the activity reproducing time, *Raja naevus* is characterised by a continuous ovulatory cycle.

Teeth sexual dimorphic ontogenesis in *Raja asterias* (De La Roche, 1809)

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Abstract:

Different teeth morphology is a common sexual feature in several species of Rajidae. Present literature for *Raja asterias*, the commonest skate in the central Tirrenian Sea, reports few information about sexual teeth dimorphism. The aim of this work is to investigate the possible changes in teeth shape with size in males and females of this species. This is part of an on-going study whose purpose is to relate such a phenomenon with the achievement of maturity and/or to a possible profit during the feeding activity.

A total of four hundred individuals of *Raja asterias* were collected during the whole 2000 in the central Tirrenian Sea from bottom otter trawlers and fish markets located in the research area. We present here our preliminary observations on differences of teeth shape between sexes, obtained using an image acquiring programme.

The value of public sightings recording schemes in relation to the basking shark

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Abstract:

For a number of years, public sightings recording schemes have been utilised to gather simple, non- effort related data on the basking shark (*Cetorhinus maximus*) in the UK, both on a national and local basis. These have emulated successful cetacean sightings recording schemes involving members of the public, and are recognised for contributing as much in terms of public awareness, as in overall scientific understanding of the distribution of the species. This paper will compare the results obtained from a successful public sightings scheme in the south-west of England, with a three year effort related survey within the same region, in terms of the level of sightings, overall numbers and temporal and spatial distribution of basking sharks, to examine how closely related the results obtained in each survey may be, and to suggest ways in which such schemes might be improved.

Behaviour of the basking shark in the northeast Atlantic: A new study using pop-up satellite telemetry

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Abstract:

Basic aspects of the biology of the basking shark (*Cetorhinus maximus*) remain unknown, a lack of knowledge which does not allow appropriate assessment of its conservation status. Chief among these deficiencies is the fact that the whereabouts of basking sharks for much of the year are not known. During summer months in temperate waters circumglobally, these sharks filter-feed on surface zooplankton near water-mass boundaries (fronts), however where these sharks come from and where they go to outside of summer has not been investigated. It has been hypothesised that basking sharks hibernate in deep water during winter. In this new study we test this hypothesis directly by deploying pop-up archival transmitting tags on basking sharks in the English Channel and off Scotland to determine for the first time their migration routes and overwintering areas.

Conservation and management of shark populations: the role of uncertainty

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Abstract:

Uncertainty in vital rates can affect results of demographic analyses of animal and plant populations. The effect that uncertainty in our estimates of biological parameters of shark populations has on the calculated estimates of population parameters has not been explored for this taxon, but can have direct conservation and management implications. I used age-structured life tables and matrix population models to model the demography of 41 shark populations from 38 species of sharks representing 4 orders and 9 families. I used Monte Carlo simulation to reflect uncertainty in the estimates of vital rates and calculate population statistics and elasticities for these populations. I also used correlation analysis to identify the vital rates that explained most of the variation in population growth rates (λ). The populations I examined fell along a continuum of life-history characteristics that can be linked to elasticity patterns. Sharks with early age at maturity, short lifespan, and large litter size have high λ values and short generation times, whereas sharks that mature late, have long lifespan, and have small litter size have low λ values and long generation times. Sharks at the “fast” end of the spectrum tend to have comparable adult and juvenile survival elasticities, whereas sharks at the “slow” end of the continuum have high juvenile survival elasticity and low age-zero survival (or fertility) elasticity. Ratios of adult survival to fertility elasticities and juvenile survival to fertility elasticities suggested that many of the populations studied do not possess the biological attributes necessary to restore λ to its original level after moderate levels of exploitation. Elasticity analysis suggested that changes in juvenile survival would have the greatest effect on λ , and correlation analysis indicated that variation in juvenile survival, age at maturity, and reproduction accounted for most of the variation in λ . In general, combined results from elasticity and correlation analyses suggested that research, conservation, and management efforts should focus on these vital rates.

Distribution and abundance of three elasmobranch species (*Galeus melastomus*, *Scyliorhinus canicula*, *Raja clavata*) based on the Mediterranean International Trawl Survey program (MEDITS)

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ABSTRACT:

Data about the distribution and abundance of three important elasmobranch species, two sharks (*Galeus melastomus* and *Scyliorhinus canicula*) and one ray (*Raja clavata*), gathered within the Mediterranean International bottom Trawl Survey program (MEDITS), are analysed and here reported. Indices of abundance for standardised area (km²), both in weight and number, and length structures were collected during spring months from 1994 to 1999 along the Mediterranean coasts (from the Alboran Sea to the Aegean Sea). Five depth strata, between 10 and 800 m depth, are considered. Data are presented by geographical sub-sector and macro-area. Overall, 6336 hauls were performed and 44 elasmobranch species identified. The global estimate of standing biomass resulted in 55,158 tons, 42% of which was represented by the three investigated species.

The three target species occurred throughout the investigated area: *Scyliorhinus canicula* and *Raja clavata* were caught in all explored depths, although with a preference between 50 and 500 m, whereas *Galeus melastomus* occurred almost exclusively in the slope. While *Scyliorhinus canicula* was almost uniformly distributed along the Mediterranean, some geographical difference in the mean biomass indices (BI; kg/km²) were detected for *Galeus melastomus*, which was more abundant in the Western sectors (48.5 kg/km²), and *Raja clavata* was mainly found in the Eastern sectors (27.0 kg/km²).

As far as the length frequency distributions are concerned, two basic typologies were identified for the two sharks, according to the predominance of small (less than 30 cm TL) or large sized individuals, suggesting some geographical differences in total mortality rates.

A NOVEL CONTRIBUTION TO SYSTEMATICS AND TAXONOMY OF MEDITERRANEAN SPECIES OF *RAYA* BASED ON MORPHOLOGICAL AND MOLECULAR DATA

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Abstract:

In order to improve the systematics of the genus *Raja* and to optimise useful markers for species identification, 24 morphometric/meristic parameters and a mtDNA gene fragment were analysed in 121 individuals collected in the Adriatic Sea during GRUND 2000 and MEDITS-IT 2001 scientific surveys. Each specimen has been identified according to referenced morphological keys and it was then characterised for the nucleotide sequence variation of a 240bp-16SrDNA gene fragment amplified by PCR (Parker & Kornfield 1996). Phylogenetic relationships among *Raja* species were assessed by means of estimates of pair-wise genetic distance and construction of dendrograms.

After morphological analysis, most of the individuals were attributed to 5 putative species: *R. clavata* (22), *R. asterias* (26), *R. montagui* (5), *R. miraletus* (55), *R. oxyrinchus* (10). Three individuals (2 young males and 1 females) were undetermined. Strong difficulties have been encountered in the species identification of several specimens, mainly concerning those with a *R. asterias*-like morphological pattern. Among the 26 individuals putatively ascribed to *R. asterias*, 23 possessed a 16rDNA sequence identical to that shown by all *R. clavata* specimens. Thus, it can be hypothesised they are likely *R. clavata* individuals specifically misidentified based on morphological features. Four individuals (2 males and 1 female), which showed a sequence weakly divergent from the *R. clavata* sequence (~3%), were presumed to be *R. asterias*. The comparison between data obtained from molecular and morphological approaches revealed that the species *R. clavata* and *R. asterias* could be morphologically distinguished only by the number of median thorns (*R. clavata* < 50; *R. asterias* > 50). The 3 undetermined skates showed a highly different sequence (~8%).

Phylogenetic analysis based on 16SrDNA sequences showed a clustering of species into 5 evolutionary lineages: *R. clavata*-*R. asterias* (sister taxa), *R. montagui*, *R. oxyrinchus*, *R. miraletus*, and *Raja spp.*

The present investigations revealed the usefulness of pairing molecular marker analyses to the traditional morphological approach to improve the systematics and taxonomy of *Raja* species since high plasticity of several morphometric and meristic characters can lead to species misidentification and uncertainty in the recognition of young and adult stages of rays.

Blood Cells Morphology of Mako Shark (*Isurus oxyrinchus*)

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Abstract:

The information about the characteristics of elasmobranchs fishes blood cells is resumed by a few information relevant to a small number of species, this work extend the morphology data of erythrocytes, lymphocytes, monocytes, heterophiles, basophiles, eosinophiles and thrombocytes of Mako shark.

ULTRASTRUCTURAL AND HISTOMORPHOLOGICAL OBSERVATIONS ON THE AMPULLAE OF LORENZINI IN SOME BENTHIC MEDITERRANEAN ELASMOBRANCHS

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Abstract:

The Ampullae of Lorenzini are electrosensitive organs always present in both electric and non-electric elasmobranchs. They are mainly localised in the rostral part of the head, and their main role is in the detection of low electric fields. This property is mediated by the presence in the dilated portion of the ampullae, of ciliated apical receptor-cell membranes which can produce graded, negative receptor currents opposite in direction to the fields applied. Few elasmobranchs species are at present investigated and very few studies concern ampullar putative neurotransmitters. In the present research we want to examine the morphology and histology of the ampullae in some benthic selachians (*Torpedo marmorata*, *Raja asterias*, *Etmopterus spinax*, *Galeus melastomus* and *Scyliorhinus canicula*) at the Scanning and Transmission Electron Microscopy (SEM and TEM), and Light Microscopy (LM). These selachians are common in the Ligurian Sea and they are usually bycatch component in the demersal fishery activities. The 40 specimens studied (about 8 for each species) were collected in the Gulf of Genoa, Ligurian Sea, by a professional bottom trawl at different depth. After deep anaesthesia by MS 222 (Sigma Chemical Co., USA) and decapitation, different clusters of Ampullae of Lorenzini were fixed in paraformaldehyde and differently prepared for LM, TEM and SEM observations. Furthermore, the presence of presumptive neurotransmitters, such as VIP, somatostatin, and serotonin was investigated at LM by immunohistochemical techniques using rabbit polyclonal antisera (Biotopica, Italy). The neurotransmitter ACh was put in evidence by the immunodetection of its related enzyme Cholin-Acetyl-Transferase (ChAT). The anti ChAT rabbit polyclonal antisera was from Chemicom (USA).

From a morphological point of view, the dilated portion of ampullae is partitioned in sensory vesicles, from which a common tubule, the canal, extends to a dorsally or ventrally located cutaneous pore. The number of the ampullar sensory vesicles varies according to the species considered. The size of ampullae was related to that of the specimens considered. No species differences were observed in the sensory vesicular epithelium which appear to be bistratified. Long synaptic ribbons can be seen both in the basal and apical portions of ciliated sensory cells.

Among the presumptive neurotransmitters investigated, only ChAT-immunoreactive nerve fibres were demonstrated; the ChAT-immunoreactive nerve terminals seem to be located beneath and/or around the ciliated sensory cells.

Our ultrastructural and morphological observations, are in accord to those from literature. At present there is no evidence of an interrelationship between the number

of the sensory vesicles and an enhanced electroreceptive sensitivity. This is the first immunohistochemical demonstration of ACh-presumptive neurotransmitter in the selachian Ampullae of Lorenzini.

Sounds produced by four sharks species in captivity: initial findings

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ABSTRACT:

Little is known about the sounds and noises produced by sharks, during feeding and swimming.

What are their frequencies and levels? Are there species-specific characteristics in the sound structures? How far can these noise propagate? Can the potential preys of sharks detect and recognize them?

To document these sounds, examine their features and answer the above questions, underwater recordings were made at the Delphinarium Riccione (June, July 2000 and July 2001) and at the Cattolica Park "Le Navi" (October 2000) on four different species: *Carcharhinus melanopterus*, *Ginglymostoma cyrratum*, *Triaenodon obesus*, *Scyliorhinus canicula*.

The work is still in progress and the paper presents the first results, that appear, in some part, surprising.

CASE STUDIES OF ELASMOBRANCH HUSBANDRY AT OCEANÁRIO DE LISBOA (JOÃO P. S. CORREIA, MIGUEL T. DE OLIVEIRA, NUNO ANTUNES, NUNO PEREIRA, MARK F. L. SMITH)

Miguel T. de Oliveira

Oceanário de Lisboa

Abstract:

Oceanário de Lisboa opened on the 22nd of May, 1998, with a large collection of elasmobranchs from both diverse geographical regions and having a wide range of ecological requirements. Such diversity translated into a number of problematic situations requiring some original solutions. Some of the more interesting case histories have been presented herein. Specifically: (1) the amputation of a broken Rhinobatus typus rostrum; (2) non-rigid rostrum in Himantura uarnak and H. undulata; (3) feeding initiation of Aetobatus narinari; (4) feeding initiation and behaviour of Pteromylaeus bovinus; (5) pre-copulatory behaviour of Stegostoma fasciatum; (6) iodine deficiency and correction in Carcharhinus plumbeus; (7) Monogenea trematode infestation and eradication in Carcharhinus limbatus and C. melanopterus; (8) Stegostoma fasciatum and Aetobatus narinari sensitivity to organo-phosphates.

Elasmobranchs in the Deep Sea; Why are they absent from the Abyss?

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Abstract:

Using an autonomous lander known as the Aberdeen University Deep Ocean Submersible (AUDOS) extensive investigations have been carried out on the deep scavenging fauna attracted to carrion at depths from 500m to 5800m in the Pacific Ocean, Atlantic Ocean and Mediterranean Sea. Together with data from trawls and traps the depth distribution of elasmobranchs is described. Despite the absence of swim bladders in these fishes the abyssal plains of the world's oceans are devoid of elasmobranchs. There seems to be some factor limiting them to depths less than 2500m. Preliminary data from acoustic tracking using ingestible acoustic transponders indicates that elasmobranchs are active scavengers at the depths at which they do occur. We hypothesise that their metabolic rate is too high to allow survival in the food sparse conditions of the abyss. Photographs and videos of deep elasmobranchs *in situ* will be presented.

Elasmobranch species from the Celtic Sea : Preliminary results about their feeding ecology through trace metal and stable isotope measurements

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Abstract:

There is an increasing concern about the trace metal pollution effect on commercial fishes such as elasmobranchs. Trace metal (Zn, Pb, Ni, Cd, Fe, Cr, Cu, Se, and Hg) and stable isotope measurements ($\delta^{15}\text{N}$ et $\delta^{13}\text{C}$) were determined in the tissues of five species of commercial sharks from the Celtic Sea: the tope *Galeorhinus galeus*, the black-mouthed dogfish *Galeus melastomus*, the spiny dogfish *Squalus acanthias*, the lesser-spotted dogfish *Scyliorhinus canicula* and the starry smooth hound *Mustelus asterias*. The tope display highest $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ values reflecting their higher trophic position while the spiny dogfish have the lowest $\delta^{15}\text{N}$ et $\delta^{13}\text{C}$. Ni, Cr, and Pb were close to the detection limit in the tissues of the five species. Zn and Cu are similar between the five species while Fe and Cd concentrations display large specific variations. The highest renal Cd concentrations were displayed by the black-mouthed dogfish while the lowest were measured in the starry smooth hound (respective mean : 1.42 and 0.8 $\mu\text{g.g}^{-1}$ dw). A significant relationship was found between hepatic $\delta^{15}\text{N}$ and renal cadmium suggesting that the highest values encountered in the black-mouthed dogfish might be related to cadmium contaminated preys such as cephalopods. However, further research is needed to get a better understanding of the trace metal transfer within Celtic Sea predators.

SOME INFORMATION ON THE BIOLOGY OF THE BROWN RAY (*RAJA MIRALETUS* L., 1758) IN THE SOUTHERN ADRIATIC BASIN

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Abstract:

The brown ray is widely distributed in the Mediterranean, and it is one of the most abundant cartilaginous fish on Adriatic trawlable bottoms. Information on distribution and species biology is reported for some Mediterranean areas, but data from Southern Adriatic are scanty.

Samples of *R. miraletus* came from international trawl surveys (MEDITS Project) funded by E.U.) carried out from 1994 to 2001 in the southern Adriatic basin and from national trawl surveys (years 1993-2000) carried out in the western side of the same area (Italian waters).

The collected specimens were measured and weighed by sex; with regard to morphometry, total length (TL) and disc width (DW) were recorded (mm). Sexual maturity was assessed by means of Holden and Raitt maturity scale for elasmobranchs.

Morphometric relationships were studied by means of regression analysis. Piece-wise regression analysis was also utilised to identify male's maturity phases.

Maximum recorded size (total length) was 51 cm for female specimens and 48 cm for male ones. Mature individuals have been found at lengths larger than 40 cm and 44 cm for male and female respectively.

Results were discussed and compared with other Mediterranean available data.

In the bathroom with *Alopias pelagicus*.

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Abstract:

No behavioural data is available for the pelagic thresher shark (*Alopias pelagicus*). In 1998, they were found on a seamount, Monad Shoal, in the Cebu Channel, Philippines. Uniquely, they can be seen at a diveable depth (18-25 metres deep) with near 100% reliability for the first three hours after first light. They come from the deep to cleaning stations on top of the northern end of the plateau populated by principally by cleaner wrasse (*labroides* spp.). Butterflyfish, surgeonfish, and other wrasse have also been seen to "clean"; and manta and devil rays are amongst their clients. Given that we see very little of their lives of the threshers, it is a bit like studying humans by watching them in the bathroom: but actually there is a lot to be learnt even here: cleaning behaviour, interactions, hierarchies, family relationships, population size and dynamics, influence of external/seasonal factors, and kinematics. Of particular interest is the holding patterns the sharks engage in whilst waiting their turn at a cleaning station, much akin to those used by aeroplanes waiting to land. Despite them being broadly homogenous in appearance, a few of them are clearly distinguishable on account of damaged fins, peduncles, trailing fishing line, scars, etc. From these individuals, it can be deduced that the population is at least partially resident and estimates of a population size of several hundred have been arrived at. Thresher sharks are amongst the many elasmobranch species directly and increasingly targeted by artisanal fishermen, using novel methods of catching their prey. Furthermore the behavioural ecology of these sharks is threatened by the unregulated interest from recreational divers and professional photographers/film crews. A sustainable development project has been started to maintain their presence by generating revenue for the local community through funding social welfare programs.

PRELIMINARY OBSERVATIONS ON BIOLOGY OF *GALEUS MELASTOMUS* (CHONDRICHTHYES, SCYLIORHINIDAE) IN THE SOUTHERN TYRRHENIAN SEA (CENTRAL MEDITERRANEAN)

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Abstract:

The blackmouth catshark *Galeus melastomus* Rafinesque, 1810 is commonly caught along all the Southern Tyrrhenian Sea. The knowledge about the biology of this species are limited especially in this area. On this respect data collected from four trawl surveys carried out during spring 1999-2001 and autumn 2000, are analysed in order to contribute about space-time distribution, length structure, length-weight relationship, and maturity of the blackmouth catshark. The investigated area is situated between Capo Suvero (Calabrian coasts) and Capo San Vito (Sicilian coasts) in the Southern part of the Tyrrhenian Sea. A commercial vessel equipped with a trawl net with 36 mm meshes was used. A stratified random sampling method was adopted: the hauls were distributed among five strata: A: 10-50 m; B: 50-100 m; C: 100-200 m; D: 200-400 m; E: 400-750 m. The specimens were weighted, counted, measured (as TL = total length), and sexed directly on board. The maturity stage of the gonads was also recorded. On the whole 564 specimens (293 males and 271 females) were caught from 200 to 700 metres of depth. The percentage of positive hauls (relative to D and E strata only) was, in the whole, 51%. The length of the specimens ranged from 10.5 to 50 cm of TL for males and females respectively. Besides the largest animals measured, the population of *G. melastomus*, in the investigated area, was mainly constituted by young specimens.

The length frequency distributions were always plurimodal, however, some differences were observed in population composition according to the sampling season. On the basis of weight-length relationship an isometric growth was observed. Finally as concern the maturity, the most part of the population was made up of individuals in pre-reproductivity phase.

From the coast towards the abyss: evolution of deep-water catsharks

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Abstract:

Molecular phylogenetics has been useful to study shark evolution, especially through character mapping onto molecular phylogenies. Bathial distribution of representative genera of catsharks (Scyliorhinidae) extending out from the intertidal zone to the abyss can be correlated with the progressive development of snout length. Snout length is linked to the efficiency of the electric sense, promoting the detection of electric and magnetic fields. The progressive decrease of solar light intensity with depth is an unvarying environmental constraint imposed on marine organisms with eyes. Without being the single cause, it might however have driven the evolutionary process within a "field of possibilities". Darkness of the deep-sea has required the development of a sense other than eyesight, e.g. electroreception, for spatial orientation and non bioluminescent prey detection. In this letter, using molecular phylogeny, we show that snout elongation is an evolutionary trend within catsharks; short snouts being a primitive character state. Through the correlation of increasing electrosensory system efficiency with depth, we illustrate a particular example of an evolutionary process, constrained and orientated by a putative selective force: the decrease of solar light. We conclude that deep-sea catsharks had a coastal origin from an ancestor with less sensitive electroreception.

Identification of Species Composition in the Hong Kong Shark Fin Trade using Genetic Techniques and Trader Records

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Abstract:

Trade in shark fins represents one of the most serious threats to shark populations worldwide. Previous studies have indicated that certain types of fins are more valued than others, but due to the largely unregulated and often covert nature of the trade, information on actual species composition has been anecdotal and unverified. In order to examine the potential impacts of the shark fin trade on the abundance of various shark species, a study of the species composition in the world's largest shark fin trading center, Hong Kong, was initiated. Several approaches for distinguishing the species identity of dried fins were evaluated including visual differentiation (shape, color and morphometrics), denticle recognition, and DNA-based methods. This assessment found that genetic analyses were necessary to reliably determine species identity, and a technique involving application of polymerase chain reactions (PCR) with species-specific primers was selected. A sampling program was developed based on the requirements of the PCR technique, the practicalities of accessing samples, and the ability to draw statistically robust conclusions. Shark fins from twelve market categories were sampled and analyzed across a broad range of traders to investigate the concordance between trader names for fins and the associated species identity. Preliminary results indicating an initial matching of trade names and species identities will be presented. These data will subsequently be used in combination with daily shark fin auction records to estimate verified, species-specific proportions and quantities of shark fins in the trade.

Some preliminary investigations on the distribution of Basking shark (*Cetorhinus maximus*) in the Mediterranean Sea

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Abstract:

Data collected within the "Large Elasmobranch Monitoring" programme have given in the past years a general picture on the distribution of Basking shark (*Cetorhinus maximus*) along Italian waters.

Recently new records coming from the entire Mediterranean basin have been reported and included in the LEM database. The aim of this work is to give preliminary indication on the presence of this species in the whole Mediterranean Sea, according to the new data set. Knowledge on the distribution and population structure of Basking shark in the Mediterranean basin, in fact, is important for the implementation of its protection status as stated by the Barcelona Convention. More than 300 records concerning Basking sharks are now included in the archives, some of which belonging to the 19th century. Records revealed the presence of all size specimens within the Mediterranean Sea going from very young individuals (about 2 m of TL) to adults (8-9 m of TL) and also of mature specimens. In particular it is very interesting the records of presence of Basking Shark in Turkish waters as being one of the few data reported for the eastern sector of Mediterranean Sea.

Sexual maturity stages of *Galeus melastomus* (Rafinesque 1809) in the Tyrrhenian Sea: formulation and validation of a new maturity index

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Abstract:

General criteria to describe maturity stages in elasmobranchs were defined by Holden and Raitt in 1974. These authors developed a maturity index for both sexes taking into account the morphological features of reproductive system. Successively, in a specific study focused on the reproductive biology of *Galeus melastomus*, Capapè concluded that fish size could be used as a good indicator of sexual maturity stage.

The above mentioned indexes, applied to a sample of *G. melastomus* collected from November 1999 to January 2001 in Ligurian and central Tyrrhenian Sea, seemed inadequate and questionable. In fact, due to the large variability especially observed in mature females, the number of maturity stages proposed by the authors appeared to be insufficient. On the other hand, the subjectivity connected with both the two methods, make them susceptible to bias. For this reason, we developed a new maturity index that combined the morphological features of reproductive apparatus with some objective variables, such as gonadosomatic and uterosomatic indexes, relative claspers length and mean lengths of individuals at maturity stages. The suitability of each variable for discriminating among the different maturity stages was statistically tested.

Results demonstrated that a simple method based on both morphology of reproductive structures and objective species-specific features are efficacious in estimating the maturity stage of individuals in *G. melastomus*. We argue that a routine involving statistical validation of distinctive sexual maturity variables could be put to use in other oviparous species, such as skates, and at last in all elasmobranch species.

Environmental Education as a tool in the conservation of sharks.

Zullette del Socorro Andrade González.

Universidad de Guadalajara. Centro Universitario de Ciencias Biológicas y Agropecuarias. Km. 15.5 Carretera a Nogales. Las Agujas, Nextipac, Zapopan, Jalisco.

Many people still believe that sharks are the most dangerous specie worldwide but if we try to improve its manage using strategies such the environmental education, we can reinforce a better reputation of this top-predator. With this material I offer to all of you and helping me with some games and educative material I wish I would like to make conscience, mainly to children, whom I made this poster in order to play and learn at the same time, and respect this species. I try to show the principal species we have in order to make concience among us the importance of marina conservation in mexican waters.

Key words: Education, sharks, conservation.

Getting the shark fin message to the consumer (abstract)

Susie Watts

WildAid

Abstract:

While International efforts to collect and assess data on shark status and exploitation and to achieve sustainability in shark fisheries appear to be increasing, along with a general awareness of the vulnerability of sharks and the importance of conserving them. However, WildAid believes that a major element has been lacking in international attempts to conserve sharks and that is the education of shark consumers.

Similarities between the shark trade and the international trade in rhino horn and ivory give great cause for concern, since it was the trade in their body parts which severely depleted the elephant and brought the rhino to the very edge of extinction. This concern increases when one realises that some of the same individuals are involved.

With the Chinese middle class - that is, people with disposable income - now estimated to number 250 million, the time to educate consumers is now.

WildAid is working with national and local governments, local NGOs, advertising agencies and celebrities in Singapore, Malaysia, Thailand, Taiwan and China to persuade consumers that shark fin soup poses a major threat to sharks and that consumption must be reduced now if their children are to enjoy this traditional delicacy. This paper outlines the various initiatives currently being taken in those countries.

Chronoethology and resting behaviour of juvenile freshwater stingrays (*Potamotrygon motoro*)

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Abstract:

Biological rhythms are prominent and well studied in teleost fishes. Biological rhythm research in elasmobranch fishes is rare and to our knowledge, there is no laboratory study existing about activity patterns of rays. Six juvenile specimen of the Amazonian freshwater stingray, *Potamotrygon motoro*, from the breeding group of Frankfurt Zoo, ranging from 19 to 26 cm total-length, were studied under aquarium conditions with 12 / 12 h light / dark-phase. The results shows that there were specimen with rhythmical as well as with non-rhythmical activity patterns. Food-searching behaviour was almost always induced by the presentation of food and continues with breaks throughout the rest of the day and night and stopped at the latest with the beginning of the light-phase.

Resting behaviour could be divided in short-term resting and long-term resting. Short-term resting is characterized by lying on the bottom for not more than ten minutes on average. Long-term resting could be described as lying within the substrat, while the body-disc is covered with sand. It lasts one hour on average with am maximum duration of more than six hours.

Juvenile *P. motoro* are not only nocturnal or crepuscular fishes, they also demonstrate diel activity.

Observations on the blue shark, *Prionace glauca* (L., 1758) (Pisces: Carcharhinidae), from the coast of Algeria

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Abstract:

Investigations conducted from off the coast of Algeria between 1996 and 1999 allow to observe 170 blue sharks, among them 123 females and 47 males. Sex ratio of this sample is presented *versus* size and seasons. *P. glauca* is more captured off the western area and the eastern area from the Algerian coast. The former could be considered as a reproductive area of the species.

Key-words: Elasmobranchii, Carcharhinidae, *Prionace glauca*, Mediterranean, coast of Algeria, sex-ratio.

The Shark Longline Survey

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Harald Gay, German Elasmobranch Society, Marine Biology Student at Greenwich University

Abstract:

The United States (U.S.) NOAA reported increasing commercial landings of coastal and oceanic sharks in the U.S. western North Atlantic and Gulf of Mexico (1993). During the same period recreational landings decreased as a result from what was believed to be overfishing of unregulated shark fisheries. In efforts to maintain viable shark populations, the NMFS (an agency of NOAA) developed the 1993 Fisheries Management Plan (FMP) for Sharks of the North Atlantic Ocean. This plan stresses the need for monitoring and assessment of shark populations to determine the efficacy of FMP measures. NMFS Mississippi Laboratories instituted field surveys (1995 - 2001) with support from the NMFS Highly Migratory Species Division to assess distribution and relative abundance of coastal sharks in the western North Atlantic Ocean and the Gulf of Mexico. Longline Gear was selected for the studies because it is the preferred gear of the commercial fishing industry to implement pelagic or bottom longlining. Survey data recorded to characterize gear and catch includes gear specifics, and environmental and biological data pertaining to sharks and bycatch. Since inception of the assessment over 5,000 sharks have been captured representing 24 species; most of them were tagged, all relevant data recorded, on demand of other scientific institutions DNA samples taken, and most sharks released alive to facilitate tagging studies.

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ABSTRACT :

The guidelines or codes of conduct that regulate human interactions with dolphins and sharks have been discussed and reviewed, both through relevant literature and interviews conducted with five individuals from various marine backgrounds. The main issues for and against these interactions taking place have been identified and where possible the guidelines discussed regarding how they aim to resolve these issues. It was found that there are many more regulations, from international to local, controlling the dolphin interactions but that these varied from very simplistic and ineffective in coverage to effective enforceable legislative tools. However, few of them set out criteria to tackle the actual concerns, for the most part they appeared to be aimed at controlling the industry. For sharks there were found to be very few guidelines, the ones located were aimed either at specific species or locations. Again these did little to tackle the concerns that were voiced and for the most part shark interactions go on unregulated. Finally the management approaches available were discussed and where possible examples of how guidelines could possibly be incorporated into these approaches were identified.

Distribution and reproductive biology of two deep-water squalid sharks, *Centroscymnus coelolepis* (Portuguese dogfish) and *Centrophorus squamosus* (leafscale gulper shark), in the Rockall Trough area of the Northeast Atlantic

Abstract :

The distribution and reproductive biology of two deep-water squalid sharks, *Centroscymnus coelolepis* (Portuguese dogfish) and *Centrophorus squamosus* (leafscale gulper shark) have been studied using pre-fishery and recently collected survey data from the continental slope to the west of the British Isles. The results show that the commercial deep-water fishery appears to have had more of an effect on the leafscale gulper shark than on the Portuguese dogfish, with a reduction in the abundance of larger mature individuals of leafscale gulper shark. Small individuals of both species (<60 cm) were absent from all data analysed. Immature fish were generally found at greater depths than the adults. Numbers of sharks landed from a market sampling program showed a greater similarity in the ratio of males and females caught for the leafscale gulper shark than the Portuguese dogfish. The lack of pregnant female (D to F stage) leafscale gulper sharks in both pre- and post fishery surveys might suggest that the fishery would have less of an impact on this species than on the Portuguese dogfish where pregnant females are landed. It is possible that the distribution (both vertically and geographically) of the Portuguese dogfish exceeds that of the commercial fishery resulting in less exploitation of the whole stock.

The IUCN Shark Specialist Group

Rachel Cavanagh

SSG Programme Officer

Abstract:

The Shark Specialist Group has received a grant from the Global Wildlife Division of the UK Department of the Environment to employ a fulltime Programme Officer, to coordinate the work of this otherwise voluntary group. This presentation will provide a summary of the recent activities and achievements of the IUCN Shark Specialist Group, and discuss future projects, with a view to the SSG becoming far more active on an international scale. These include the assessments of elasmobranch species for the IUCN Red List, assistance with CITES proposals and the development of national plans of action for shark fishing states. The role of the SSG within Europe will be discussed in the context of future work of the group.