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IATTC and ICCAT: Understanding Drivers of Change for Bycatch Mitigation in Two RFMOs

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IATTC and ICCAT: Understanding Drivers of Change for Bycatch Mitigation in Two RFMOs

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Table of Contents

Part 1

- 1.1 Abstract..... 3
- 1.2 Acronyms and Abbreviations..... 3-4

Part 2

- 2.1 Introduction: Roles and Responsibilities of Regional Fisheries Management Organizations..... 4-5
 - 2.1.1 Inter-American Tropical Tuna Commission (IATTC)... 5
 - 2.1.2 International Commission for the Conservation of Atlantic Tunas (ICCAT)..... 5-6
- 2.2 Background: The Bycatch Dilemma..... 6-7
 - 2.2.1 Primary Non-target Species Taken as Bycatch..... 7-9

Part 3

- 3.1 Objectives & Methodology..... 9
- 3.2 Comparative Analysis of Resolutions for Management of Bycatch: IATTC and ICCAT..... 10-13
- 3.3 Results: IATTC & ICCAT Thematic Coded Analysis.... 14-24

Part 4

- 4.1 Discussion..... 25-26
- 4.2 Conclusion..... 26-27
- 4.3 Recommendations..... 27-30

Acknowledgement30

References 30-34

Appendix 35-67

Part 1

1.1 Abstract

Regional Fisheries Management Organizations are global organizations responsible for the management of migratory fish stocks on the high seas. As a consequence of large-scale fishing, bycatch is widespread and the impacts of discards on populations can be great. These organizations are thus critical for ensuring the ecological and economic viability of large migratory pelagic fishes and other organisms found throughout international waters. To that end, two RFMOs—the Inter-American Tropical Tuna Commission (IATTC) and the International Commission for the Conservation of Atlantic Tunas (ICCAT)—have been exploring ways to mitigate bycatch and have passed resolutions such as IATTC’s resolution on a three-year program to mitigate the impact of tuna fishing on sea turtles (C-04-07) and ICCAT’s resolution on reducing incidental bycatch of seabirds in longline fisheries (07-07).

In this paper, I evaluate the factors that drive change for bycatch mitigation in IATTC and ICCAT, and report on the progress of these organizations. To do this, I have studied the effectiveness of past resolutions and gained a thorough understanding of the drivers of change from industry advice through a series of semi-structured interviews with fourteen scientists and policy makers engaged in RFMO management. In this report I recognize progress through the passing of several resolutions that employ restrictions and mitigation measures. I also recognize NGO pressure as necessary to persuade management to create resolutions and employ practical mitigation measures. I found deficiencies in data standardization and collaboration among field members that hinder progress. Both IATTC and ICCAT have made significant progress and my analysis reveals that substantial improvements still need to be made. I ultimately provide recommendations that can be integrated by these two RFMOs. The recommendations fall into three categories: data improvements, proposed investments, and initiatives to foster cooperation.

1.2 Acronyms and Abbreviations

- RFMO:** Regional Fisheries Management Organization
- IATTC:** Inter-American Tropical Tuna Commission
- ICCAT:** International Commission for the Conservation of Atlantic Tunas
- CCSBT:** Commission for the Conservation of Southern Bluefin Tuna
- IOTC:** Indian Ocean Tuna Commission
- WCPFC:** Western and Central Pacific Fisheries Commission
- RFB:** Regional Fishery Body
- PEW:** Pew Environment Group
- ISSF:** International Seafood Sustainability Foundation
- FAD:** Fish aggregating devices
- ACAP:** Agreement on the Conservation of Albatrosses and Petrels
- EEZ:** Exclusive economic zone
- NMFS:** The National Marine Fisheries Service
- IUU:** illegal unreported and unregulated
- VSM:** Vessel Monitoring System
- ISC:** International Scientific Committee

AIDCP: Agreement on the international dolphin conservation programme

EPO: Eastern Pacific ocean

TED: Turtle excluder devices

Part 2

2.1 Introduction: Roles and Responsibilities of Regional Fisheries Management Organizations

Regional Fisheries Management Organizations (RFMOs) are global institutes responsible for the management of migratory fish stocks on the high seas and that migrate through waters and adjacent seas of more than just a single state or country (Small 2005). These organizations provide scientific and managerial support with the mandate of sustainable exploitation of commercially important fish stocks, mostly tuna, in their respective areas of coverage (Aranda et al. 2010). They are necessary for the management of large migratory pelagic fishes and the ecological functionality of oceanic environments. Following the FAO's Code of Conduct for Responsible Fisheries and the United Nations Fish Stocks Agreement (1995), RFMOs' responsibilities have expanded to include research and management of organisms taken incidentally, as bycatch, in order to efficiently manage harvest of regional and global high seas fisheries.

There are five RFMOs with management responsibilities for fisheries that focus on tuna and "tuna-like" species [Fig. 1]: the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), Inter-American Tropical Tuna Commission (IATTC), the International Commission for the Conservation of Atlantic Tunas (ICCAT), Indian Ocean Tuna Commission (IOTC), and the Western and Central Pacific Fisheries Commission (WCPFC).

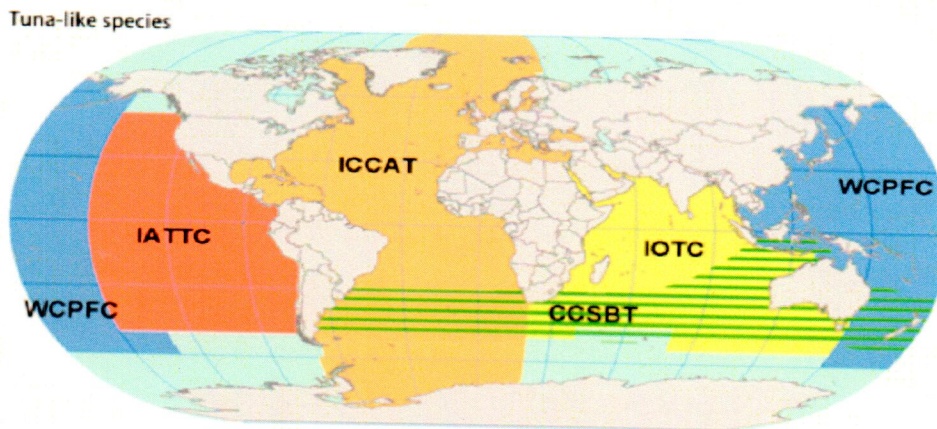


Fig 1. European Commission 2012 retrieved from:
http://ec.europa.eu/fisheries/cfp/international/rfmo/index_en.htm

RFMOs were established as international collaborative memberships to manage stocks of prized commercial species in waters beyond national jurisdiction (such as the exclusive economic zones [EEZs]) (FAO 2010-2012). According to the Agreement for the implementation of the provisions of the UN Convention on the Law of the Sea, organizations such as RFMOs have a duty to "the conservation and management of straddling fish stocks and highly migratory fish stocks (UN Law of the Sea)." Although

RFMOs were initially created to manage commercial fish stocks in international waters, they have increased their responsibilities to account for the management of species linked to or affected by the commercial take of international high seas fisheries. For this study, I focus on two RFMOs: the Inter-American Tropical Tuna Commission (IATTC) and the International Commission for the Conservation of Atlantic Tunas (ICCAT).

2.1.1 Inter-American Tropical Tuna Commission (IATTC)

The IATTC was established in 1949, after Costa Rica and The United States raised concerns over the management of important commercial fisheries, with a focus on large migratory species—particularly tuna and other baitfish. Although primary focus is the management of target species, IATTC was the first international tuna organization to extend their responsibilities to include bycatch and non-target discards. For this, they rely on scientific staff to perform research and aid in administrative decisions (Allen 2000). An important milestone for bycatch issues arose as the tasks of IATTC were broadened in 1976 to address the problems arising from the incidental mortality caused by international vessels (Gjersten, et al. 2010). In the recent Antigua Convention, which strengthened and replaced the 1949 Convention and entered into force on August 27, 2010, mitigation measures specifically addressing bycatch species were set into force. The Antigua Convention also addressed IATTC's responsibilities for the implementation of AIDCP and therefore serves as an important milestone for issues related to bycatch mitigation. To manage such tasks, IATTC has a number of detailed functions. Specific to bycatch issues, IATTC is responsible for:

- Scientific research concerning the abundance, biology and biometry in the Convention Area of fish stocks and, as necessary, of associated or dependent species
- Adopting, as necessary, conservation and management measures and recommendations for species belonging to and affected by fishing for, or dependent on or associated with, the fish stocks covered by the Convention
- Measures to avoid and reduce waste, discards and catch of non-targeted species, catch by lost or discarded gear and impacts on associated or dependent species, in particular endangered species
- Promote the application of any relevant provision of the Code of Conduct and of other relevant international instruments

Although IATTC is the older and more structured of the two RFMOs, it still faces a number of challenges, particularly regarding bycatch management. That said, it has made important progress toward dealing with the bycatch issue, from the adoption of AIDCP, to more recent regulations addressing changes in gear and observer coverage. Key initiatives for IATTC have brought about a more positive attitude in dealing with bycatch issues and some encouraging resolutions, particularly addressing sea turtle mitigation.

2.1.2 International Commission for the Conservation of Atlantic Tunas (ICCAT)

The ICCAT was created as an inter-governmental fishery organization in 1966 and formally entered into force in 1969 (ICCAT 2007). The commission has a relatively

large membership with a majority of coastal state members in the Atlantic territory (Aranda et al. 2010). Its establishment was created with the priority of managing and bearing responsibility upon the conservation of tunas and other tuna-like species of the Atlantic Ocean and bordering seas, an area referred to as the “convention area.” With 30 target species of concern, its members consist of governments with mutual interest in maintaining the populations of these species, cooperating in developing rules, regulations and agreements based on continuous scientific research in order to establish maximum sustainable fishing levels. Through its Convention, ICCAT undertakes management of scientific work from member scientists in order to develop management bodies whose focus is the maintenance of healthy stock abundance. ICCAT relies on national scientists from member and cooperating non-member parties to conduct the bulk of data collection, scientific research and stock assessments. The commission therefore does not have its own scientific committee.

As a contracted party, scientific data and analysis of tuna is collected externally. However, because data is outsourced, data is not standardized and quality varies extensively. More recent data collection has shed light on environmental analysis and studies with a focus on bycatch species. The bulk of the advancement in bycatch progress for ICCAT has taken place in seabird mitigation.

2.2 Background: The Bycatch Dilemma

Bycatch is the catch of non-targeted species during commercial fishing activities. This includes catch during fishing activities as well as unobserved mortality from abandoned gear and/or fatal injuries. The mortality of discarded fish and other marine species has become a pressing issue in ecosystem conservation and fisheries management (Gjertsen et al. 2010). Because bycatch is difficult to account for and measure, there is high uncertainty in estimating fishing mortality worldwide and therefore the repercussions can seldom be fully understood (Davis 2002). According to Dr. Martin Hall (Gjertsen 2010), bycatch expert and principal scientist at IATTC, “bycatch has become one of the most pressing fishery management issues of our time.” Because of the loss of biomass and biodiversity as a result of bycatch, ecological impacts are hard to measure and understand and can be far reaching across all oceans of the globe (Gilman 2011).

For fisheries of highly migratory species such as tunas and billfish – such those managed by IATTC and ICCAT – bycatch can include a broad range of taxa from marine mammals, to migratory seabirds, sea turtles, elasmobranchs and others. Commercially irrelevant but biologically important animals such as sea turtles, marine mammals and seabirds are lost to commercial fishing practices on a daily basis. Given high mortality of many species as a result of bycatch, ecological impacts, though hard to measure and understand, may be significant (Pope et al. 2000).

There are a number of additional issues that further contribute to the bycatch problem. These include: gear restrictions and selectiveness, cooperation among stakeholders (the public, government, academia, environmentalists, and the fishing industry), lack of standardized data documentation and data sharing, illegal fishing and lack of accountability from minimum observer coverage on vessels (Alverson et al. 1996, Babcock et al. 2003 and Gjertsen et al. 2010). There are a number of reasons as to why these issues are not resolved. A few important ones include economic feasibility,

political “red tape” and overall unwillingness of industry to participate.

For centuries, the lack of appropriate measures to manage fishing activities has led to the collapse of biological and commercially important fish stocks across the world’s oceans. Traditional management structures exploit stocks and discard countless tons of bycatch, leading to irreversible changes in ecosystems (Alverson et al. 1996). The lack of sustainable approaches to management in the past has led to the unrecoverable collapses of some species, i.e.—North Atlantic cod (Pauly and Maclean 2003). Economic losses tied to discards run into the billions of dollars, and include discards for species of both commercial value to other fisheries, non-legal discards (for reasons of size, abundance policy, etc), and indirect costs related to the discards of non-target species of little commercial value (Alverson et al. 1996). Many non-target species are taken annually in high seas fisheries and because of the sheer size and complexity of the open ocean, many pelagic species are left vulnerable to commercial fishing fleets. Assessing the extent of the damage by these vessels is complicated by high costs of observer programs, sparse data and logistically complex surveys (Lewison et al. 2004). Slow maturing species such as sea turtles, sharks, and marine mammals are especially vulnerable and subject to decline over short periods of time if not managed effectively.

2.2.1 Primary Non-target Species Taken as Bycatch

Sea Turtles

Sea turtles are a migratory and transboundary animals traveling thousands of miles and returning only to their natal beach to lay their eggs. For this reason, their conservation requires global cooperation (Grafton et al. 2010). Sea turtles are heavily impacted by both anthropogenic and natural factors and the most detrimental is international fishing operations (Gilman et al. 2007). Sea turtles are caught primarily by trawl, pelagic longline and coastal gillnet fisheries. Six of the seven extant sea turtle populations worldwide are listed in The World Conservation Union (IUCN) Red List of Threatened Species. Of those, three are considered critically endangered (leatherbacks [*Dermochelys coriacea*], Kemp's ridleys [*Lepidochelys kempii*] and hawksbills [*Eretmochelys imbricata*]), and another three as endangered (greens [*Chelonia mydas*], loggerheads [*Caretta caretta*] and olive ridleys [*Lepidochelys olivacea*]). Although advances in technology have developed turtle exclusion devices (TED’s) and have changed fishing gear (from J to circle hooks) to minimize their bycatch, fisheries bycatch continues to be a major cause of decline on a worldwide basis. Fisheries bycatch has been implicated as an important factor in many population declines, including Pacific loggerhead and leatherback sea turtles (Lewison et al. 2004) and pelagic longline bycatch has been implicated in the population decline of both loggerhead and leatherback sea turtles in the Pacific (Spotila et al. 2000).

Growing concern over sea turtle bycatch has pushed RFMOs and other fishing authorities to implement multilateral agreements that include responsibility of regional sea turtle conservation. Although there are no existing legally binding measures that require vessels to reduce bycatch or utilize avoidance measures, major fisheries and RFMOs are adopting voluntary measures to address this bycatch as a part of their managerial goals (Gilman et al. 2007). Additionally, illegal unreported and unregulated (IUU) fishing and small-scale fisheries poses further threats. More mitigation measures such as population impact assessments; gear modifications (TED’s, dehooking gear and circle hooks) and

Vessel Monitoring Systems (VMS) are vital towards preserving these vulnerable species (Gilman et al. 2007).

Seabirds

Some species of seabirds, such as albatrosses, petrels and shearwaters are steadily declining as a result of longline fisheries bycatch. According to abundance data, flesh-footed shearwaters die at 1800–4500 birds per annum (Wilcox and Donolan 2007). Furthermore, global studies have shown that there is great overlap of foraging behavior with tuna vessels for many critically endangered seabirds. These studies of foraging behavior found that over half the foraging sites overlapped with tuna vessels, with most of this overlap occurring in areas of highest fishing activity (Pascoe et al. 2011).

Albatrosses and petrels are also caught by demersal and pelagic longline fisheries and have one of the highest proportions of species listed in the IUCN Red List of Threatened Species of any bird family (Lewison et al. 2004) with the main issues related to interactions with longline fisheries (Birdlife International 2004). An FAO global review of seabird bycatch published in 1999 showed that albatrosses (Family Diomedidae), giant petrels (*Marconectes* spp.) and petrels (*Procellaria* spp.) are severely affected by mortality caused by pelagic and demersal longline fishing (Brothers et al. 1999). That said, there are a number of relatively inexpensive technical solutions that can dramatically reducing seabird deaths and can even increase fish catch (Gilman et al. 2005, Løkkeborg 2011).

Sharks

Populations of a vast number of sharks are steadily declining in many parts of the world. This ongoing decline threatens their existence in large part due to overfishing, bycatch discards, habitat degradation, and slow recovery rates (Ferretti et al. 2008).

The loss of sharks is a concern. Apex predators feed on the animals below them in the food web, helping to regulate and maintain the balance of ecosystems. Apex predators directly limit the populations of their prey, which in turn affects the prey species of those animals, and so on (Sergio et al. 2006). Although they play a crucial role in marine ecosystems, management is difficult because there is generally a lack of information about shark populations (Ferretti et al. 2008). In addition, popular demand from Asian fisheries for shark fins has driven commercial fishing for sharks to record high levels (Ferretti et al. 2008). The practice of finning—cutting off the fins and throwing the remainder of the shark overboard—has contributed greatly to their global decline (Lewison et al. 2004). This practice also makes it difficult for data documentation essential for scientists to understand the impact of fisheries in the global shark decline. In addition, bycatch among pelagic longline and gillnets is high, making many of these species highly vulnerable to extinction. Their reduction has negatively affected predator stocks and in turn has changed the abundance and interaction of lower level prey species. Such reductions represent conservation challenges to fishery managers as well as ecological disturbances across global oceans (Estes & Terborgh 2010).

Marine Mammals

There are approximately 125 marine mammal species worldwide represented by five groups: pinnipeds (seals, sea lions, fur seals, and walrus), cetaceans (whales, dolphins, and porpoises), sea otters, sirenians (dugongs and manatees), and polar bears (Marine Mammal Commission, Global Species List). Marine mammals are protected under

global regulations and in the United States under the Marine Mammal Protection Act (MMPA). Dolphins in particular are protected under the Agreement on the International Dolphin Conservation Program (AIDCP)- a legally binding agreement among purse seining countries to abide by strict dolphin mortality limits, rules, regulations, data, etc to mitigate dolphin mortality in purse seine tuna-related fishing activities. The AIDCP agreement and other mortality-reducing methods, such as the “back down method”- a procedure where purse seine vessels literally back down nets to allow for dolphins to escape (Groswald 1995), have helped reduce dolphin mortality greatly. That said, bycatch and reduction in prey abundance from commercial fishing has a profound effect on marine mammal populations (Reeves 2000). Despite international high seas driftnet bans, fixed gill nets still cause high mortality levels for both cetaceans and pinnipeds (Reeves 2000). In the United States the majority of observed bycatch occurs in gill-net fisheries (Read et al. 2006), however, fisheries interactions with marine mammals also occur in both pelagic and bottom longline fisheries throughout the world’s oceans (National Marine Fisheries Service Report 2008). Bycatch affects all marine mammals and despite their protection, bycatch is still rampant and affects a number of species, the most critical being the endangered vaquita porpoise (Bobadilla et al. 2011). Smaller cetaceans and pinnipeds are most vulnerable as their size means that escape once they are entangled is highly unlikely and they frequently drown (Pompa et al. 2011).

Part 3

3.1 Objectives & Methodology

The main question this study seeks to answer, what are the drivers of change in IATTC and ICCAT with regards to bycatch mitigation? To answer this, I analyzed key resolutions at each RFMO and consequently report on the results from a series of semi-structured interviews to subject-matter experts, including fourteen relevant scientists and policy makers from the following organizations: IATTC, ICCAT, PEW, ISSF, Shark Alliance and WCPFC.

The semi-structured questionnaires included a series of seven questions delivered either in-person or over the phone. The questions include: (1) What are the most significant or recent changes (in policy, mandates, resolutions, etc) with regards to bycatch management and mitigation at your RFMO? (2) What were the elements of success? (3) How well did the problem have to be documented to bring out any change? For example, what were the red flags? (4) What was the role of individual nations in pushing change? Which nations were the instigators and why? (5) What was the role of NGO's and how loud are their voices? (6) How is consensus achieved among the nations? (7) What are the main problems and what are the biggest hurdles in getting RFMOs to push changes? Following the interviews, I coded the qualitative responses into binary scores (0 or 1) in each of several discrete categories. The ensuing analysis evaluates the factors that were important to cause these organizations to undertake changes for better management practices with regards to bycatch—ultimately adopting mitigation measures.

3.2 Comparative Analysis of Resolutions for Management of Bycatch: IATTC and ICCAT

Key Initiatives and Progress Made by IATTC to Address Bycatch Issues

Initiative: Sea Turtle Mitigation

Three important resolutions have been adopted by IATTC with specific relevance of conserving sea turtles through mitigation measures that lessen bycatch of sea turtles. The commissions most promising initiatives include: Resolution to Mitigate the Impact of Tuna Fishing Vessels on Sea Turtles, (C-07-03), Consolidated Resolution on Bycatch (C-04-05) and Resolution on a Three-year Program to Mitigate the Impact of Tuna Fishing on Sea Turtles (C-04-07).

Resolution C-04-05 (rev 2)

The Consolidated Resolution on Bycatch (C-04-05 (rev 2)) reaffirmed the previous resolution on bycatch adopted at the 66th, 68th, and 69th meetings of the Commission (from 2000-2002). This resolution has paved the way for more detailed resolutions that provide advanced progress on issues related to sea turtle bycatch.

The document focuses on the reduction of incidental mortality of juvenile tunas. With regards to sea turtles, there is mention of the prompt release of sea turtles with the aim of keeping as many alive as possible. Specifically, it orders crews within the convention to use specialized techniques for handling sea turtles to improve survival after release. The resolution also requests that the crew assist turtles caught in gear and discourages the abandonment of FAD gear when not in use.

Resolution C-04-07

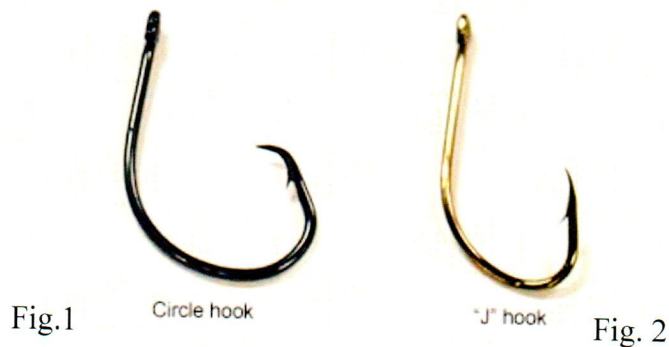
In 2004, IATTC adopted the Resolution on a Three-Year Program to Mitigate the Impact of Tuna Fishing on Sea Turtles (IATTC, 2004).

Details of the resolution called for a three-year program, from 2004-2007 that imposed the following modifications:

1. Data collection and analysis on sea turtle fishery interactions in the Eastern Pacific Ocean. Contracting parties, cooperation non-Parties and other fishing entities are encouraged to collect and provide IATTC with data and fishery interactions as relate to sea turtles.
2. A review of the effectiveness and consequent effects on target species catch rates of sea turtle avoidance methods. This includes biology of sea turtles as well as behavior, diet, migration patterns and nesting areas.
3. IATTC cooperation with FAO and regional fisheries organizations to best manage sea turtle conservation.
4. General knowledge of industry whereby all available information and data regarding sea turtles in the industry is reviewed to later develop best conservation efforts.
5. Further review of fishing gears to improve techniques that reduce sea turtle bycatch.
6. The creation of a voluntary fund to supplement the capacity of coastal developing countries to improve their conservation of sea turtles.

7. Timely reporting of relevant data including data of gear change from J to circle hooks, dehooker devices and other relevant changes.

The program is active in Ecuador, Peru, Colombia, Panama, Costa Rica and El Salvador and as a result of the implementation of this resolution; circle hooks have become the standard form of hook used for many longline fisheries. Circle hooks have gained popularity among conservation biologist for benefits relative to conventional J-style hooks (e.g. Montrey, 1999). The basic difference between circle hooks (Figure 1) and a conventional 'J'-style hook (Figure 2) is that with a circle hook, the point of the hook is generally bent in further whereas in J-style hooks the point is generally more upright. In some circle hooks, the point is actually pointed down towards the bend (Cook & Suski 2004). This difference has had significant effects in reducing mortality rates of certain species of bycatch, for example loggerhead sea turtles in pelagic longline fisheries (Lewison et al. 2004).



Following the implementation of this resolution, members at the meeting on bycatch in 2006 submitted reports on this program. Here, the depth of the data acquired was analyzed in order to determine and then grant an extension of the three-year program, which was adopted in the most recent resolution C-07-03 (Gilman et al. 2007).

Resolution C-07-03

The C-07-03 resolution reaffirmed the previous resolutions set forth and adopted by prior meetings of the commission. More specifically, it reaffirmed the Resolution on the three-year program to mitigate the impact of tuna fishing on sea turtles that had been previously adopted in 2004, expiring in 2007. By recognizing and reaffirming this measure, IATTC continues to employ the measures set forth by the FAO guidelines, which most distinctly implements the use of circle rather than J hooks and which also forces fishermen to carry and use dehooker devices to increase sea turtle survival. This change has shown to be inexpensive yet significant for several sea turtle species (Gilman et al. 2007).

In this resolution IATTC agreed to multilaterally and collectively adopt these mitigations measures along with guidelines that reduce injury and mortality of sea turtles by providing safe handling procedures, enhancing the implementation of sea turtle bycatch, injury and mortality reduction measures. The resolution further mentions the importance of utilizing scientific data as the source of information. Furthermore, the resolution reaffirms the importance of collective action by all respective governments to implement the guidelines. An important addition is the clause whereby governments are required to report to IATTC on an annual basis to report on the progress from the already existing guidelines. More measures for progress are mentioned, which include the

implementation of observer programs, onboard attention to injured sea turtles, additions of specialized bait and additional monitoring for FAD entanglement. More important than reaffirming the previous resolutions, this resolution proposes improvements by providing detailed instruction on how to best manage sea turtle bycatch. Additionally, since 2004, IATTC has worked with artisanal fishermen to help provide them with gear changes and education to help promote bycatch reduction of sea turtles.

Recent activities to mitigate sea turtle bycatch, particularly in longline gear include the abovementioned resolutions, as well as programs such as the Overseas Fishery Cooperation Foundation (OFCF) of Japan to study gear utilized in small-scale longline fisheries in the EPO. Additionally, funding by organizations such as World Wildlife Fund (WWF) has provided regional programs to retrieve and standardize sea turtle bycatch data.

Key initiatives and progress by ICCAT to address bycatch issues

Initiative: Seabird Mitigation

ICCAT has two current resolutions addressing the incidental mortality of seabirds—Resolution 02-14 and 07-07. Seabird mitigation became a forefront issue for the commission following advice by scientists at Birdlife International—a global conservation organization, and the ICCAT sub-committee on Ecosystems. ICCAT began mitigation measures affecting seabird populations by adopting an initial resolution (02-14) but later significantly improved and reinforced their duties with a their second resolution (07-07). These resolutions and the work done by IATTC members, along with outside researchers is still in ongoing and has the overarching goal of mitigating the effects on sea birds as a result of the longline fishery.

Resolution 02-14

In 2002, ICCAT officially adopted resolution 02-14 to reduce the incidental catch of seabirds in longline fisheries. This resolution encouraged ICCAT members to collect data on seabird interactions and implement the duties outlined in FAO's Code of Conduct for Responsible Fisheries. In its objectives, 02-14 encourages data collection, research and reporting. More specifically its objectives include: the identification of seabird species most at risk from fishing in the ICCAT Convention Area, the collection of data on at-sea distribution of these species, the analysis of spatial and temporal overlap between species distribution and ICCAT longline fishing effort, the review existing bycatch rate estimates for ICCAT longline fisheries, the number of total annual seabirds and the assessment of the expected impact of this bycatch on seabird populations (Philips et al. 2007). This research along with work by the Ecosystems Sub-committee at ICCAT as well as other stakeholders, served as the driver for the adoption of the Resolution on Incidental Mortality of Seabirds in 2002 adopted in 2003. Outside data provided by Birdlife International served as an initial step in the process involved utilizing data collection. Additionally, in 2001 the Agreement on the Conservation of Albatrosses and Petrels (ACAP), a legally binding international treaty to protect the world's albatross and petrel species, forced ICCAT to recognize the seriousness of these issues. The ACAP agreement marked an important international commitment to protect albatrosses and petrels, and is a considerable step forward in the conservation of seabirds in general. Lastly, resolution 02-14 mandated the Scientific Committee to report to the Commission individually to provide data on the impact of incidental mortality on seabirds (ICCAT, 2002).

Resolution 07-07

Resolution 07-07 reflects the entry into force of the Agreement on the Conservation of Albatross and Petrels (ACAP). This recommendation is binding for the use of weighted tori lines south of 20 degrees and seeks a reduction in the bycatch of seabirds in all fisheries. The panel recommended that ICCAT develop a stronger approach generally to bycatch and develop and adopt appropriate mitigation measures including reporting on the effectiveness of these measures throughout the fisheries.

The seabird assessment commenced in February 2007 at the first meeting of the Sub-Committee on Ecosystems. During this meeting, the Sub-Committee on Ecosystems agreed on a work plan to assess the impact of ICCAT fisheries on seabird populations (ICCAT, 2007). The work plan used a six-stage approach and has collated existing seabird bycatch data for the ICCAT fisheries in the Atlantic and Mediterranean. Outsourced scientific data from scientists, Birdlife International and other organizations remains relevant for bycatch data analysis. In 2005 Birdlife International published an in-depth analysis regarding the serious effects of longline fisheries on a number of seabird populations. They presented a series of mitigation measures that proved to be capable of significantly reducing bycatch and better conserving a number of seabird species. (Cooper et al., 2001). Mitigation measures included the use of bird scaring lines; line-weighting and other measures to make hooks (or nets) sink more rapidly underwater; regulation of the way in which fish offal and discards are disposed of during fishing; setting lines at night; and dyeing bait to make it less attractive to birds. Additionally, coastal states have submitted seabird bycatch data to ICCAT for several years. Results from the ICCAT seabird assessment became available in 2008 (Gilman et. al 2007) and the work to develop and implement measures that decrease incidental mortality of seabirds is ongoing.

3.3 Results: IATTC & ICCAT Thematic Coded Analysis

Table 1. Results on significant or recent changes with regards to bycatch management and mitigation at RFMO level.

Q 1: What are the most significant or recent changes with regards to bycatch management and mitigation at an RFMO level?

Responses: Person	ST Mit	SB Mit	Incr OC	NT Pop Ass	Incr BC mit A	Incr BC mit P/R
1 (IATTC)	1	1	0	1	1	1
2 (IATTC)	0	0	0	1	1	1
3 (IATTC)	1	1	1	1	1	1
4 (IATTC)	1	0	1	0	1	1
5 (IATTC)	1	0	1	0	1	1
6 (SPC/WPCFC)	0	1	0	1	1	1
7 (SPC/WPCFC)	1	1	0	1	1	1
8 (ICCAT)	0	1	0	0	1	1
9 (ICCAT)	0	1	1	1	1	1
10 (NOAA/ICCAT)	1	1	0	1	1	1
11 (ICCAT)	1	1	0	1	1	1
12 (Shark Alliance/ICCAT)	0	0	0	0	1	1
13 (ISSF/ICCAT)	0	1	0	0	1	1
14 (PEW)	1	0	1	0	1	0
IATTC total	4 (80%)	2 (40%)	3 (60%)	3 (60%)	5 (100%)	5 (100%)
ICCAT total	2 (33%)	5 (83%)	1 (16%)	3 (50%)	6 (100%)	6 (100%)
Total	8 (57%)	9 (64%)	5 (36%)	8 (57%)	14 (100%)	13 (93%)

ST Mit = Sea turtle mitigation

SB Mit = Seabird mitigation

Incr OC = Increased observer coverage

NT Pop Ass = Non-target species population assessments

Incr BC mit A= Increased bycatch mitigation awareness

Incr BC mit P/R= Increased bycatch mitigation projects and/or resolutions

Table 1 lists the recent changes with respect to the categories listed: sea turtle mitigation, seabird mitigation, increased observer coverage, non-target population assessments, increased bycatch mitigation awareness and increased bycatch mitigation projects or resolutions. There was consensus among 100% of respondents that ecosystem management, and thus bycatch mitigation, is a growing concern, as indicated by the unanimous indication of increased bycatch mitigation projects within the RFMOs (Table 1).”

In IATTC, 4 out of the 5 (80%) respondents mentioned that resolutions C-07-03, C-04-05 and C-04-07 related to sea turtle mitigation were significant advances in bycatch mitigation. In addition, one of the respondents argued “changes from J to Circle hooks are an important accomplishment for sea turtles. However, monitoring and investing in new gear technologies is miserable (Person 3, IATTC).” This suggests that advances to address bycatch mitigation do exist in the resolutions, however, further investment and monitoring of measures is still necessary. Lastly, increased observer coverage was mentioned by 3 out of the 5 respondents (60%) while all five (100%) agreed that resolutions and general mitigation awareness is on the rise.

In ICCAT, 5 out of the 6 respondents (83%) agreed that the resolutions set by the commission to address sea bird mitigation are significant advances for bycatch mitigation. Within the responses, participants singled out resolution 02-14 and 07-07. According to ICCAT representative, "in the last few years, the push for bycatch mitigation has been exponential"(Person 11 ICCAT)." The 100% response on increased bycatch mitigation resolutions indicates that there is a definite increase in bycatch mitigation awareness and suggests that bycatch mitigation consciousness is growing and will continue to result in policy changes affecting RFMO management.

Despite increased awareness and concern, 93% of respondents indicated that better observer coverage and/or population assessments are key towards better management of bycatch species. Results also indicate that policies and resolutions that consider non-target species as relevant are on the rise.

Table 2. Results on elements of success for bycatch resolutions.

Responses: Person	Q 2: What were the elements of success?				
	Mit Tech	Res SB	Res ST	Data doc/Obs	Pass Res
1 (IATTC)	1	1	1	0	1
2 (IATTC)	1	0	0	1	1
3 (IATTC)	1	1	1	1	1
4 (IATTC)	1	0	1	1	1
5 (IATTC)	1	1	1	1	1
6 (SPC/WPCFC)	1	1	0	1	1
7 (SPC/WCPFC)	1	1	1	1	1
8 (ICCAT)	1	1	1	1	1
9 (ICCAT)	0	0	0	1	1
10 (NOAA/ICCAT)	1	1	0	1	1
11 (ICCAT)	1	1	0	1	1
12 (Shark Alliance/ICCAT)	1	0	0	1	1
13 (ISSF/ICCAT)	1	1	0	1	1
14 (PEW)	1	0	1	1	1
IATTC total	5 (100%)	3 (60%)	4 (80%)	4 (80%)	5 (100%)
ICCAT total	5 (83%)	4 (67%)	6 (100%)	6 (100%)	6 (100%)
Total	13 (93%)	9 (64%)	7 (50%)	13 (93%)	14 (100%)

Mit Tech = Practical mitigation techniques

Res SB = Seabird resolutions

Res ST = Sea turtle resolutions

Data/doc Obs = Data documentation from assessments and/or observers

Pass Res = Passing resolutions by reaching consensus

Table 2 revealed general consensus on the elements of success with regards to bycatch resolutions and policies—practical mitigation techniques. The table suggests that observer data and building consensus among nations is critical. Of the 14 participants, 100% of them agree that consensus building is an important element of success for addressing bycatch mitigation, while 93% agree that data documentation is necessary. Lastly, 100% of respondents agree that passing resolutions serves as an important stepping-stone for the future management of bycatch of non-target species.

With regards to sea turtle mitigation measures at IATTC, practical solutions that were noted as the most effective included: circle hooks, de-hooking devices, onboard training, and bait changes for certain species. However, despite the consensus on the “best” measures to employ, 5 out of the 14 respondents (36%) mentioned that mitigation techniques for sea turtles are not highly effective. The need to document sea turtle bycatch on longline fisheries was mentioned by 13 out of the 14 (93%) respondents. This indicates that better observer coverage—particularly for largely unobserved longline vessels—is necessary to be able to better assess existing measures and gain leanings to develop newer/better ones.

Table 2 also reveals that 93% of respondents agree that data documentation via observer coverage is indispensable. Having data was quoted as an important indicator for developing successful responses to bycatch mitigation. Within this realm, IATTC respondents indicated that scientific estimates of bycatch, particularly with sea turtles, is critical in order to assess the success of the mitigation measures implemented by existing

resolutions. Having databases for non-target species was deemed “progressive, essential and crucial” by several respondents.

In ICCAT, practical mitigation techniques that were regarded as successful for sea birds include: tori lines, night-setting, weighted branchlines, underwater setting, blue-dyed bait and bait capsules. These measures were described as “easy to employ and economically feasible,” making streamer lines, night setting and weighted branch lines the most effective mitigation measures when used properly and in combination. In addition, respondents from ICCAT recognized the collaborative work done by scientists at Birdlife International and ACAP as a leading effort for seabird mitigation.

Table 3. Results on the role of information.

Q 3: What was the role of information, for example, what were the red flags?

Responses: Person	Data Doc/Obs	Assesments	Pop Decline	Data Analysis
1 (IATTC)	1	1	1	1
2 (IATTC)	1	1	0	1
3 (IATTC)	1	1	0	1
4 (IATTC)	1	1	0	1
5 (IATTC)	1	0	1	1
6 (SPC/WPCFC)	1	1	1	1
7 (SPC/WCPFC)	1	1	0	1
8 (ICCAT)	1	1	0	1
9 (ICCAT)	1	1	1	1
10 (NOAA/ICCAT)	1	0	0	1
11 (ICCAT)	1	1	0	1
12 (Shark Alliance/ICCAT)	1	1	1	1
13 (ISSF/ICCAT)	1	1	1	1
14 (PEW)	1	0	1	1
IATTC total	5 (100%)	4 (80%)	2 (40%)	5 (100%)
ICCAT total	6 (100%)	5 (83%)	3 (50%)	6 (100%)
Total	14 (100%)	11 (79%)	7 (50%)	14 (100%)

Data doc/Obs = Data documentation and observer programs

Pop Decline = Population Decline (as a red flag to indicate need for mitigation measures)

Assesments = Assessments conducted by individual RFMO

Data Analysis = Data analysis that can include data obtained from consultants and/or public information

Table 3 further demonstrates the central role of information as a key tool to alert policy-makers about the problems associated with bycatch. All respondents (100%) agreed that data availability, particularly through observer coverage, is necessary to understand the biological effects of fishing activities on non-target species. Table 3 results also indicate that data analysis is an important tool to indicate population interactions and therefore bycatch issues with 100% of respondents agreeing that it plays a major function. Therefore, data documentation, observer coverage and population assessments are vital for progress in bycatch resolutions and practical mitigation measures.

IATTC respondents (80%) agree that population impact assessments are necessary to provide scientists and policy makers with key data on population health. Of these, only 40% mentioned evident population decline as an indicator for increased mitigation measures. Similarly, 100% of ICCAT respondents agree that data documentation via observer programs is necessary for understanding the role of information relative to bycatch management.

ICCAT respondents agree that following presentations by Birdlife International, it became clear that the industry is responsible for population decline of albatrosses and petrels whose most imminent threat comes from bycatch by longline fisheries (ACAP). With that, 83% agree that population impact assessments are necessary tools to understand the effects of the industry and address the necessary issues. Additionally, 100% agree that data documentation via observer coverage is indispensable.

Previous ICCAT responses (Table 1) further support Table 3 by indicating the need to employ mitigation measures and resolutions for seabirds. Problems with sea turtles in the longline fishery were mentioned by 50% of respondents (Table 1) and results from Table 7 indicate that data deficiency and lack of observer coverage is the primary cause. The above table, Table 3, indicates that 100% of respondents agree that data availability provides indication of population health.

Table 4. Results on the role of individual nations in pushing change.

Q 4: What was the role of individual nations in driving change?					
Responses:	PA	CD	IF	EC	Collitions
Person					
1 (IATTC)	1	1	0	1	0
2 (IATTC)	1	0	0	0	1
3 (IATTC)	1	0	1	0	1
4 (IATTC)	1	0	0	0	0
5 (IATTC)	1	0	1	0	1
6 (SPC/WPCFC)	1	1	1	0	0
7 (SPC/WCPFC)	1	0	1	0	1
8 (ICCAT)	1	1	0	1	1
9 (ICCAT)	1	0	1	1	1
10 (NOAA/ICCAT)	1	0	0	1	0
11 (ICCAT)	1	0	0	0	1
12 (Shark Alliance/ICCAT)	1	1	1	1	1
13 (ISSF/ICCAT)	1	0	0	0	1
14 (PEW)	1	0	1	1	1
IATTC total	5 (100%)	1 (20%)	2 (40%)	1 (20%)	3 (60%)
ICCAT total	6 (100%)	2 (33%)	2 (33%)	4 (67%)	5 (83%)
Total	14 (100%)	4 (29%)	7 (50%)	6 (43%)	10 (71%)

PA = Political Agenda

CD = Cultural motivations and/or differences

IF = Industry focused

EC = Conscious of the environmental effects to some degree

Table 4 results indicate the role of individual nations in driving change for bycatch mitigation at an RFMO level. Categories include the following as the primary causes for driving changes related to bycatch mitigation: political agendas, cultural beliefs, industry focused, environmentally conscious and derived primarily from country coalitions. All respondents (100%) agree that individual political agendas of each nation serve as the primary cause of either advocating for or against bycatch mitigation measures, and therefore policy changes result from such. Because consensus is necessary for policy measures to become adopted by each RFMO, industry focused nations were noted by 7 (50%) respondents in both IATTC and ICCAT as important hurdles for bycatch mitigation resolutions, specific mention of countries included: Taiwan, Korea, Japan, China, Spain and Portugal. According to one ICCAT respondent, "their reluctance to provide data documentation and/or increase observer coverage is therefore an impediment towards developing more bycatch-minded resolutions (person 10)." On the opposite end, according to IATTC respondents, under the leadership of conservation-oriented countries, such as the US, Brazil and Uruguay, sea turtle assessments and data documentation became a forefront issue. According to one IATTC respondent, "it is important to note that outspoken advocates (nations) for bycatch mitigation impose widespread international political pressure and bargaining of all nations is a common form of negotiation (person 3)."

In IATTC, 100% of respondents prioritized political agenda as the primary role in driving change at an RFMO level. Of these respondents, only 20% argued that cultural differences are relevant for initiating changes, while 40% agree that industry-focused nations play a significant role. A majority of IATTC respondents (60%) also agree that

country coalitions are a main driver for advocating or impeding change with respect to bycatch mitigation at an RFMO level.

In ICCAT, we observe similar responses with all respondents (100%) agreeing that political agenda is the primary tool in driving change. However, 67% of respondents at ICCAT agree that countries are now conscious of the environmental effects to some degree.

Moreover, 50% of respondents, 3 from IATTC, 2 from ICCAT and 3 from other organizations agree that there are further limitations from the divide among the industry itself. According to one IATTC and a PEW respondent, purse seine fisheries are demanding stricter regulatory measures—particularly increased observer coverage for the longline fisheries--while longline-driven countries are reluctant to agree and are strongly opposed to increased observer coverage on their vessels. Both IATTC and ICCAT respondents agree that this issue has particularly affected sea turtle mitigation since the level of bycatch in longline activities is largely unknown and sea turtle foraging behaviors and transboundary habitat makes them highly prone to longline hooks.

It is important to note that 10 out of 14 (71%) respondents agree that individual countries and/or coalitions play a significant role in driving policy changes regarding bycatch management. Some countries advocate more than others, and the political pressure to do so is influenced internally by public scrutiny, sanctions and NGO criticism. Moral and cultural issues were barely mentioned by respondents (29%) and it became clear that industry and political agendas of individual countries and/or coalitions of countries are the main drivers of change.

Table 5. Results on the role of NGO & environmental groups in influencing change.

Q 5: What was the role of NGO's and how loud are their voices?

Responses: Person	Crucial	Catalyst	Supporting Role
1 (IATTC)	0	1	0
2 (IATTC)	1	0	0
3 (IATTC)	1	0	0
4 (IATTC)	1	0	0
5 (IATTC)	0	0	1
6 (SPC/WPCFC)	1	0	0
7 (SPC/WCPFC)	1	0	0
8 (ICCAT)	1	0	0
9 (ICCAT)	1	0	0
10 (NOAA/ICCAT)	1	0	0
11 (ICCAT)	1	0	0
12 (Shark Alliance/ICCAT)	1	0	0
13 (ISSF/ICCAT)	0	1	0
14 (PEW)	0	0	1
IATTC total	3 (60%)	1 (20%)	1 (20%)
ICCAT total	5 (83%)	1 (17%)	0 (0%)
Total	10 (71%)	2 (14%)	2 (14%)

Table 5 indicates the overwhelming importance of NGO and environmental groups for influencing political change at a global RFMO level. The majority of respondents (71%) identified NGO voice as crucial, with only 14% indicating that NGO's have a secondary or supporting role.

Of the IATTC respondents, 3 out of 5 agreed that NGO's and environmental groups play a crucial role in driving change at RFMO level with respect to bycatch mitigation.

Of the ICCAT respondents, 5 out of the 6 agreed that NGO's play a crucial role. According to a former ICCAT chair "change is driven by noise, by the neighbors, by countries that pressure us." Organizations such as Oceana, PEW, Birdlife International and Greenpeace were recognized individually as catalysts of change. Additionally, recent outcry by environmental organizations focused on sharks was mentioned. Again, individual nations where NGO's are considerable and well funded were singled out.

NGO's have been the main driver of change according to a number of respondents including: ICCAT, IATTC and two environmental organizations. RFMO scientists complement data deficiencies by utilizing NGO's research and therefore their scientific and political influence cannot be ignored. Even in countries such as Japan where NGO voice may be minimal (according to 2 participants), they still serve as global catalysts to drive or hinder particular agendas and impose political pressure.

Table 6. Results on achieving consensus.

Q 6: How is consensus achieved among nations?

Responses: Person	Neg at Meet	Pol press	Sev Step P	Out neg
1 (IATTC)	N/A	N/A	N/A	N/A
2 (IATTC)	0	0	1	0
3 (IATTC)	0	1	1	1
4 (IATTC)	1	1	1	1
5 (IATTC)	1	1	1	1
6 (SPC/WPCFC)	N/A	N/A	N/A	N/A
7 (SPC/WCPFC)	N/A	N/A	N/A	N/A
8 (ICCAT)	1	1	1	1
9 (ICCAT)	1	1	1	1
10 (NOAA/ICCAT)	1	1	1	1
11 (ICCAT)	1	1	1	1
12 (Shark Alliance/ICCAT)	1	1	1	1
13 (ISSF/ICCAT)	1	1	1	1
14 (PEW)	0	1	1	1
IATTC total	2 (40%)	3 (60%)	4 (80%)	3 (60%)
ICCAT total	6 (100%)	6 (100%)	6 (100%)	6 (100%)
Total	8 (57%)	10 (71%)	11 (79%)	10 (71%)

Neg at Meet = Negotiations at annual meetings

Pol press = Political Pressure

Sev Step P = Several step process

Out neg = Outside negotiation (aka- negotiation and bargaining outside the official meetings)

Results for Table 6 were difficult to quantify and range of responses was wide. General agreement was that achieving consensus among nations is a long process involving a series of negotiations, particularly bargaining outside of the annual meetings themselves. Scientific presentations providing obvious data, for example on population decline, seemed to drive mutual understanding between nations on proposing new agreements and/or resolutions.

In IATTC, 40% of respondents argued that negotiations at meetings are important for achieving consensus among nations while 60% agree that outside negotiations take precedent.

In ICCAT, 100% of respondents agree that negotiations during annual meetings are important for achieving consensus. The same was agreed upon (100%) for outside negotiation as a pillar for reaching political consensus.

The respondents observed that political pressure and coalitions among certain nations serve as tool for reaching compromises. Data collection from working groups and continuous workshops serve as starting points for new resolutions. Once certain resolutions are proposed, a negotiation process begins and resolutions are likely to follow. That said, the processes of imposing change can be long and there is no template on how to best achieve consensus among the commission.

Table 7. Results on general problems and hurdles for driving change at RFMO level.

Q 7: What are the general problems and/or hurdles in getting RFMOs to adopt changes?

Responses: Person	Data Def	C & DS	Consensus	Resistance	Impl: Monit/Comp
1 (IATTC)	1	1	0	0	0
2 (IATTC)	1	1	1	0	1
3 (IATTC)	0	0	1	1	1
4 (IATTC)	0	0	1	1	0
5 (IATTC)	1	0	1	0	0
6 (SPC/WPCFC)	1	1	1	0	1
7 (SPC/WCPFC)	1	1	1	1	1
8 (ICCAT)	1	1	1	0	0
9 (ICCAT)	1	0	1	0	1
10 (NOAA/ICCAT)	1	1	0	1	1
11 (ICCAT)	0	0	0	1	1
12 (Shark Alliance/ICCAT)	1	1	1	1	1
13 (ISSF/ICCAT)	0	0	1	1	0
14 (PEW)	0	0	1	1	1
IATTC total	3 (60%)	2 (40%)	4 (80%)	2 (40%)	2 (40%)
ICCAT total	4 (67%)	3 (50%)	4 (67%)	4 (67%)	4 (67%)
Total	9 (64%)	7 (50%)	11 (79%)	8 (57%)	9 (64%)

Data Def = Data deficiency

C & DS = Collaboration & data sharing

Impl: Monit/Comp = Implementation: Monitoring and Compliance

Table 7 indicates the main problems and/or hurdles for pushing RFMOs to adopt change for bycatch mitigation. Categories include: data deficiency, collaboration/data sharing issues, reaching consensus, resistance to change and implementation.

The majority, 79% of all respondents agree that building consensus is the primary hurdle for adopting change and adopting new resolutions or measures. Of these, only 35% argue that data sharing and collaboration is an impediment. However, 50% of respondents agree that collaboration and data sharing is an issue.

At IATTC, 60% agree that data deficiency is a major concern while 80% agree that consensus building is the primary hurdle. Implementation and monitoring only mention from 40% of IATTC participants.

At ICCAT, 67% agree that data deficiency is a main hurdle while the same 67% agree that consensus building is a primary hurdle. Lastly, of ICCAT respondents, half argued that data collaboration and data sharing is a major drawback.

Consensus building is therefore the highest concern for all participants. Therefore the majority of all participants agree that consensus building among nations is a primary hurdle and that resistance among specific nations deters progress for bycatch resolutions.

Part 4

4.1 Discussion

The qualitative information retrieved from the interview portion of this study revealed the complexity of achieving political consensus and therefore implementing changes via mandates and resolutions. The interviews shed light on the breadth of issues related to data deficiency and heavy influence of NGO's such as Birdlife International. A consistent theme throughout was that data is a major catalyst for progress and that despite data shortage, mitigation measures can still be adopted. It became evident that there are working resolutions in place, like C-04-07 and C-07-03 from IATTC 02-14 and 07-07 from ICCAT that are important stepping stones in the overall progress for bycatch management.

Generally, respondents agreed that even in the absence of data, practical mitigation measures should be employed because they can still have a significant impact. Data collection and analysis, however, remain the most important factors in determining species vulnerability associated with fishing activities. Increased/standardized data ultimately improves information reliability on vulnerable species, which is why it remains the top priority for all respondents. The three groups at the forefront all conversations about bycatch improvement are: sea turtles (64%), seabirds (71%) and/or sharks (57%). All participants specifically mentioned at least one of the three. Although monitoring, enforcement, and sanctions were generally deemed significant, these did not seem to be accepted as crucial to success. In addition, respondents argued that monitoring is difficult to implement since it differs on a country-to-country basis, it is thus understood that countries within the convention area are effectively abiding by the commissions rules and regulations.

The major themes that emerged from this study are as follows:

1. The importance of standardized data collection in all fisheries—with a particular focus on increasing observer coverage and data collection in longline fishery—is crucial for the development of mitigation measures that can potentially become adopted by the commissions.
2. Data retrieval and consequent analysis is vital to understand the level of bycatch and therefore consider mitigation measures. Monitoring and enforcement is also necessary for any resolution or mitigation measure to function.
3. Scientific information and data retrieved at a global level should be largely transparent and accessible to the scientific industry to foster collaboration and progress related to bycatch mitigation.
4. Individual nations can effectively pressure other nations to adopt measures aligned with their own agenda through the use of bargaining tools and political pressure.
5. NGOs and environmental organizations are a significant catalyst for issues related to bycatch. They have proven to be influential, particularly in the US and other countries that prioritize conservations efforts. Lack of environmental interest in a number of countries—particularly China, Spain, Japan, Taiwan and Korea—is a great concern.
6. Progress towards adopting an ecosystem approach is growing and generally accepted by scientists and most policy-makers in the field.

7. Negotiations that lead to resolutions are predominantly agreed to by a coalition of nations that meet and bargain outside of the committee meetings. This implies that although the official committee meetings are important, substantial progress results from unofficial meetings.
8. Future issues that were often mentioned included FAD fishing related to shark and sea turtle bycatch.

For IATTC, changes specifically addressing sea turtle mitigation were driven by a number of factors. The most important were: NGO pressure, availability of cheap and reliable replacement gear (circle hooks) and availability of data from observer coverage (mostly purse-seine). That said, a number of respondents agree that investment in additional mitigations measures and observer coverage is necessary to manage the bycatch of many of these species on longline fisheries. These efforts, along with already working mitigation efforts such as circle hooks, bait changes and line configurations are critical for the ongoing efforts to include sea turtle mitigation as an integral part of the commission's mandates. The directive of resolution C-04-07 requires countries in the purse-seine fishery to minimize entanglement and provide sea turtle bycatch data, an important measure for sea turtle populations in the EPO. Regardless, data documentation on longliners is still deficient and therefore mitigation measures' successes are largely unknown and remain weak and although progress for bycatch mitigation is still in its infancy stages for many species, progress has been made.

For ICCAT, the interview results indicate that pressure employed by Birdlife International prompted policy changes related to seabird mitigation. Their research proved to be invaluable for ICCAT, and served as catalyst to implement changes that effectively mitigate sea bird mortality. Birdlife Internationals' work identified gaps in fishing effort data and served as a red flag to identify the need to collect more data and develop a standardized system. With that, the commission initiated changes in gear and reporting—a necessary directive for the recovery affected species. Despite these changes, there is still a significant disconnect in data recovery on a country-to-country basis due to ICCAT's decentralized system. Therefore, the need to employ further measures to standardize data collection and documentation remains important.

4.2 Conclusion

Collectively, the IATTC and ICCAT Conventions cover slightly under half of the world's ocean surface (Fig. 2 Pew Policy Statement 2011). Within these areas, millions of animals of target and non-target species are caught annually, many of which travel from ocean to ocean. Expectations at a global level run high due to the vast responsibility held by these organizations to ensure the ecological and economic viability of large migratory pelagic fishes and other commercially and biologically important organisms. IATTC and ICCAT document bycatch data in an attempt to estimate discards and develop mitigation measures. Shared commonalities for progress have been made through the creation of resolutions regarding bycatch mitigation and a general movement towards ecosystem-based management. Reforms related to the policies dictated by RFMO management have shifted from a purely industrial standpoint (i.e.-target species) towards more environmentally encompassing criteria. Limitations related to political differences, data collection, data transparency, collaboration and technological deficiencies still exist and the most obvious failure between IATTC and ICCAT is the inability to achieve

consensus and approve important measures for bycatch mitigation. The two RFMOs under study have not prioritized non-target species and discards. They have, nevertheless, begun to address these issues and implement resolutions that relate to bycatch management.

Of the two RFMOs under study, IATTC has been recognized for its improvement in bycatch mitigation the three-year Program to Mitigate the Impact of Tuna Fishing on Sea Turtles (C-04-07) reforms. Resolution C-04-07 was paramount in terms of progress and change associated with bycatch reduction and sea turtle conservation. Preliminary data results of the IATTC circle hook studies showed that the implementation and use of wider circle hooks, instead of J hooks, reduced sea turtle interactions in coastal longline fisheries (IATTC, 2006b). However, results vary by fisheries and are mixed on whether or not these changes are positive throughout the industry and further data collection is crucial for assessing sea turtle populations and the effects of these measures for future management. Regardless, this resolution has served as stepping stone in the overall progress for bycatch management of non-target species, particularly sea turtles. Similarly, ICCAT has led the way in seabird resolution across the Atlantic longline fisheries following the adoption of resolution 07-07 and consequent entry into force of the Agreement on the Conservation of Albatross and Petrels (ACAP). While recognizing that both RFMOs have their own history and therefore specific set of objectives, they both share a positive progression towards the mitigation of bycatch discards. That said, the requirement to build consensus among nations still deters progress for non-target species management. Although, passing resolutions serves as an important stepping-stone for the future management of bycatch of non-target species, passing the resolutions is not sufficient. IATTC and ICCAT need to follow up and analyze the effectiveness of such resolutions—and to share the knowledge amongst the scientific community—is key in order to develop even more effective measures in the future.

Bycatch needs to be taken seriously and the importance of RFMOs in managing target and non-target stocks for the future is paramount. Ocean environments rich in biodiversity and biomass are healthier for all organisms on earth. That said, conflicting interest between fisheries, NGO's, and international politics make this a challenging issue to address and the responsible management of international fisheries can only be effective if the tools are standardized and goals are agreed upon and enforced uniformly. It is becoming evermore important for RFMOs to recognize that the overall health of the oceanic ecosystem is heavily dependent on well-managed fisheries in the high seas. With that in mind, RFMOs should bear heavy responsibility over managing both target and non-target species for healthy oceanic environments. In that case, both IATTC and ICCAT should prioritize bycatch discards as an intricate part of their managerial goals. Their commissions should encourage dialogue that includes issues related to bycatch in order to foster consensus among nations and consequently nations of interest need to rally political support to generate consensus. Recognizing the progress made in the resolutions previously discussed is an important springboard in the mitigation of unnecessary bycatch. These and further commitments for bycatch reduction by both IATTC and ICCAT remains necessary for the health of the high seas.

4.3 Recommendations

Regardless of individual organization and management of each RFMO, cooperation is key. Without collaborative work, data collection and transparency, the negotiation

process to initiate changes and develop resolutions related to bycatch mitigations become null. In general, data deficiency, data collection, data sharing and analysis is a concerning problem. Because bycatch monitoring is used to estimate the total levels of bycatch accepted by the commission, having data available to policy-makers is necessary to set healthier bycatch levels.

The recommendations provide a guideline to help RFMO decision makers learn from successes and failures of ongoing resolutions, tools, and assessment methods for the bycatch reduction

General recommendations for tuna RFMOs include fall into three categories:

1. Data improvements, including standardization of data recording.
 - Move to an online system in order to harmonize data collection among all tuna RFMOs and standardize data collection systems across oceans.
 - Set minimum data standards and data fields.
 - Improve data quality and completeness.
 - Identify factors that cause, increase or decrease bycatch and adjust resolutions accordingly.
 - Evaluate performance of mitigation methods on an annual basis.
 - Facilitate comparative studies among scientists in the field.
 - Develop real-time reporting.
 - Data should include: species-specific data on catches, effort by gear type, landings, trade, and complete bycatch and discard (both dead and alive) at the species level.
 - Increase the use of electronic monitoring systems.
 - Require that that all vessels record data on movements of highly endangered species such as loggerhead sea turtles and other bycatch species on a daily-automated logbook.
 - Mandate that countries within the convention provide bycatch data in an agreed-upon standardized format.
 - Focus on observer programs on longliners and vessels that are not currently being observed.
2. Proposed investments.
 - Invest in software to improve technology and standards for data recording and standardization.
 - Invest in research and development of new technology to improve gear.
 - Create bycatch programs in conjunction with tuna boat captains and members of the fishing community to learn about functional gear modifications and novel maneuvers.
 - Invest in in-depth analysis to evaluate the success of newer technologies and programs to determine their contribution toward mitigating bycatch.
 - Develop an interactive video monitoring system to have on vessels that cannot carry on-board supervision.
 - Consider new selectivity tools.
 - For example: Fish pumps are an innovative tool already used by the salmon industry and others fisheries across Norway where live fish are pumped up through a specialized pipe and are directly deposited alive

in a tank of water. From there, those selected for market are kept, the rest are let out in a separate hose.

3. Initiatives to foster cooperation.
 - Foster 'voluntary' and/or market incentives for the reduction of bycatch, beyond what is required.
 - Change mindset from "capture, kill and discard" to "kill what is marketable & release the rest unharmed"—as in the abovementioned example of the fish pump.
 - Adopt a "No Data—No Fishing" requirement, so that any member failing to provide credible data is prohibited from fishing.
 - Promote collaboration within the field with the goal of increasing transparency. This includes sharing case studies amongst RFMOs to learn from success stories whose learning's can be applied to other programs—for instance, dolphin mortality limits (DMLs) under the Agreement on the International Dolphin Conservation Program (AIDCP).

The following are individual recommendations for the two RFMOs under study.

IATTC:

1. Identify the most selective hooks and utilize only those to avoid sea turtle bycatch.
2. Identify the most vulnerable bycatch species and invest in gear modifications to further minimize their catch specifically.
3. Conduct a population assessment for high-risk species and continue to monitor the assessment annually.
4. Emphasize most vulnerable species and educate fishermen on their status to deter fishermen from assuming all bycatch is the same.
5. Create a bycatch mandate for coastal zones that do not already have one.
6. Increase observer coverage for long-line vessels from 5% to minimum of 25% with possible increase following data retrieval.
7. Develop a system of bycatch credits whereby nations and/or fishermen striving to reduce sea turtle bycatch are rewarded.
8. Identify well-managed sea turtle environmental groups and NGOs and encourage them to come together and provide the commission with research and tools for best management practices (similarly to what Birdlife International has done with ICCAT).

ICCAT:

1. Reduce data variance by creating a standardized system for data collection and reporting and encourage member nations to adopt this single format and promote reporting.
2. Consider creating an internal scientific committee to better collect scientific data to report to the commission.
3. Require that all long-liners that sell to members of the commission record data on movements of seabirds, sea turtles and sharks.
4. Continue the use of combined sea bird mitigation efforts and expand where measures where possible—night fishing, tori lines and bait changes.

5. Invest in technologies that further reduce bycatch, for example bait capsule and double hooks for sea birds.
6. Continuously train fishermen on the technical implementations of new methodologies.
7. Create a plan in partnership with Birdlife International to research practice tools for the reduction of seabird mortality in pelagic fisheries worldwide.

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Appendix

I) Glossary and Terms

Stock Assessments

Stock assessments are highly informative tools that provide biologists and fisheries managers with critical information on fish stocks. They involve the use of various statistical and mathematical calculations to make quantitative predictions about fish population reactions relative to alternative management choices (Hillborn et al. 2006). These assessments retrieve basic data to provide decision makers with a wide array of facts including basic biological information on population age structure, spawning behavior, natural mortality, fishing mortality, growth rate, habitat structure, migratory habits, food preferences and availability, etc. They essentially provide an estimate of total population or total biomass of the stock, painting a picture of where the population is at. Similarly, population impact assessments evaluate the health of a stock impacted by fishing efforts or other anthropogenic/natural factors. A complete stock assessment should include as much information as possible on both the fish population and the fishery itself, as well as all discards associated with its practice (Cooper 2006). Data collected on the fisheries associated with the species under assessment is essential. This type of data collection includes: gear, fishing effort, age structure of fish harvested, ratio of males to females captured and bycatch discards. The compiled data is fundamental in understanding the current status of both the stock and fishing activity in order to ensure sustainable production and predict future trends. Armed with the data retrieved from such assessments, management authorities can design a collection of restraints on fishing activities. Such restrictions include: spatial closures, quotas, total allowable catch limits (TAC), limits on size, fishing effort limits, gear restrictions, etc.

The mathematical and statistical techniques used to perform a stock assessment are referred to as the assessment model. Scientists compare different assumptions within a given assessment model, ultimately estimating the current status of the stock relative to management targets and future predictions. Data used in stock assessments can be either fishery-dependent or fishery-independent. Fishery-dependent data are derived from the fishing process itself and are collected through such avenues as self-reporting, onboard observers, portside surveys, telephone surveys or vessel-monitoring systems (Cooper 2006). Fishery-dependent data collection is one of the most valuable tools available to fishery managers and the management plans put into effect based on this type of sampling will only be as good as the data collected (Morgan et al. 2004). The most common sources of fishery-dependent data are landings records and port samples. Landing records, which result directly from the sale of caught fish, provide information only on landed catch. Fishery-independent data result from activities that do not involve the commercial or recreational harvest of fish, such as trawl, acoustic, video and side-scan sonar research surveys and some tagging experiments (Cooper 2006). Catch estimates for both, the target species as well as any bycatch involved in the fishing activities are essential in determining the status of a fishery. Because bycatch is a common side effect of directed fisheries, estimates should include non-target species and all discards in order to best assess the impact of the fishery (Morgan et al. 2004). As a part of international fisheries organizations, managers have a range of goals. Essentially, they must maintain a well-balanced fishing industry in the short term, while still preserving fish populations for the future. The ever-growing concern for bycatch

management and mitigation has influenced decision-makers and therefore stock assessments for non-target species are being conducted more frequently in order to take part of managerial goals. Tools such as stock assessments provide decision makers with as much information as possible in order to evaluate stocks and therefore make decisions on fisheries management. Just as assessments are essential for understanding and regulating fishing activities for target species, these evaluations can help biologists and policy-makers address bycatch implications.

Biological Reference Points

A reference point is a defined threshold and/or benchmark that is defined or has been estimated. This estimate is used to compare indicators to. Reference points can be direct estimates or proxies for direct estimates, depending on adequacy of available data (Gabriel et al. 2009). Through data gathering and stock assessments, scientists estimate the amount of fish in a stock and the rate of fishing mortality. They do so with regard to a stock's biological reference points set as a concrete number or value (Cooper 2006). The use of reference points is dependent on life history and availability of catch, relative abundance, stock-recruitment, and age-specific mortality, growth, and maturity data (Table (Gabriel et al. 2009)

The most commonly referred to reference point in fisheries management is Maximum Sustainable Yield (MSY), others include: spawner recruit, potential biological removal (PBR), Sustainability Assessment for Fishing Effects (SAFE), dynamic pool and production models, etc. Reference points can help provide useful information, for example information on the sustainability of a fishing operation and its effect of bycatch and discards. They help judge estimates obtained through data collection and stock assessments to guide decision makers determining how populations are being affected by fishing pressure by providing targets for how large the population or how intense the fishing pressure should be. Simple reference point estimators may serve as a good starting point for guiding management of data-poor populations because of their simplicity and minimal data requirements. However, the reference points calculated from these methods rely heavily on assumptions and educated guesses for key parameters. Despite this, reference points represent valuable tools for comparing limits on target stocks and can also aid in the management of bycatch species

Onboard Supervision

Historically, fisheries have been using observers to collect data and it is internationally understood that these programs are key for data intake, regulatory measures and conservation issues. A fisheries observer is a designated individual whose responsibility is to observe, monitor and record catch and bycatch data. Observers are meant to work as independent parties, and most are employed by individual country governments or by third party contractors (Kelleher 2005).

Despite the low cost of observers, issues arising from violent conditions at sea, influence of fishing activities on crew and resistance from some countries and/or vessels presents an ongoing challenge for management. Furthermore, observer presence often create an observer effect- whereby observer presence influences the crew, resulting in a different and often more responsible behavior than otherwise on an observer-free vessel. Similar to having a teacher in the room makes it less likely for a student to cheat. This effect, resistance from certain countries and time at sea, makes it difficult for observers to cover fishing activities across the industry. Despite this, observer programs are essential tools for monitoring discards, since their presence forces the fishing activities to abide by all

enforceable regulations. Moreover, they are critical sources of data, particularly important in data collection of non-target species and discards that are normally not prioritized by the fishing vessel's crew.

Depending on the fishery, observers can spend anywhere from a day to a few months at sea, many times much longer for high-seas longline fisheries. Upon return, observers present a report reviewing unusual occurrences, gear configuration, observations, violation and all relevant data intake relevant to catch and bycatch. The fishery-dependent information acquired by the observers becomes critically important for the management and conservation of the stock and other marine resources, thus, the quality of information acquired has direct bearing on the recommendations that scientists will use to help policy makers with managerial decisions. According to an FAO assessment of fisheries bycatch "observer programs are necessary to audit progress toward bycatch goals adequately" (Alverson et al. 1994).

FAO Code of Conduct for Responsible Fisheries

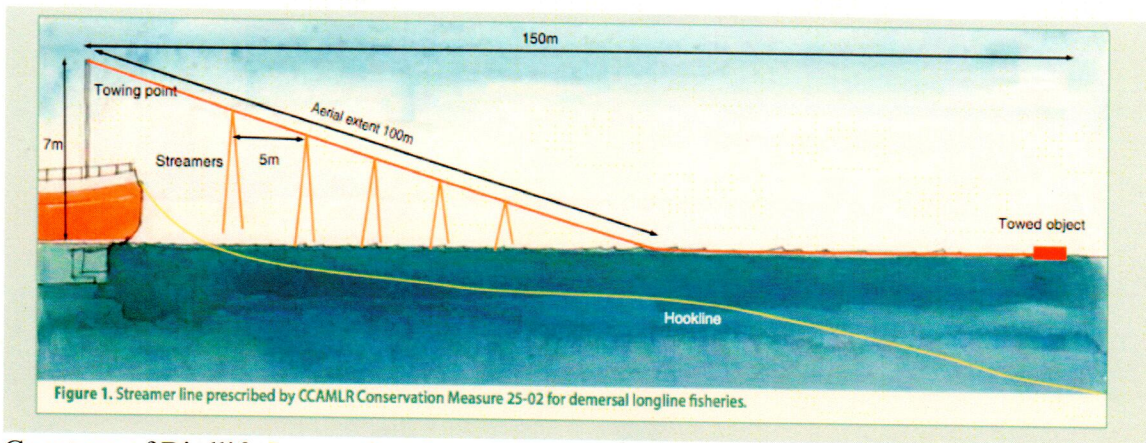
FAO is a voluntary code based on relevant rules of international law, including those reflected in the United Nations Convention on the Law of the Sea. The Code contains provisions that may be or have already been given binding effect by means of other obligatory legal instruments amongst the Parties. The Code is global in scope, and is directed toward members and non-members of FAO, fishing entities, sub-regional, regional and global organizations, whether governmental or non-governmental, and all persons concerned with the conservation of fishery resources and management and development of fisheries, such as fishers, those engaged in processing and marketing of fish and fishery products and other users of the aquatic environment in relation to fisheries. FAO, is committed to assisting Member States, particularly developing countries, in the efficient implementation of the Code of Conduct for Responsible Fisheries and will report to the United Nations community on the progress achieved and further action required (FAO Code of Conduct). IATTC also responds to the FAO code of conduct for international fisheries. Within this scope, IATTC has an overarching obligation along with other RFMOs, to utilize their resources and collective power to conserve marine resources and important species established by the frameworks and agreements mentioned above (Small 2005).

The Kobe Process

With the aim of continuing to standardize fishing activities, RFMOs have merged with other fisheries to create the Kobe process. The Kobe process seeks to harmonize the activities of the tuna regional fisheries management organizations- IATTC, WCPFC, Canada and ICCAT, and according to the Kobe Process to "play an instrumental role in assisting tuna regional fisheries management organizations move towards a more consistent, sustainable and science-based management approach that will ensure the sustainability of tuna fisheries for future generations (Kobe Process)." As a result of this initiative, three joint meetings have established specific actions and future recommendations with relation to bycatch, coordinated scientific efforts, reduced capacity, decision-making guidelines, and compliance and enforcement. The continuing cooperation of these collaborative meetings is essential in the ecosystem approach necessary to maintain healthy oceans.

Tori lines

A tori line or streamer line is a type of fishing gear used in longline fisheries where a streamer is towed from a high point near the stern as baited hooks are deployed. As the fishing vessels move forward, drag is created on the line from which streamers are suspended. These streamers serve as scare tactics for seabirds that fall victims of longline fisheries. Commercial longliners accidentally hook thousands of seabirds each year and the Food and Agriculture Organization (FAO) has identified seabird bycatch as a global problem. If set properly, streamers on tori lines prevent seabirds from taking the bait and consequently drowning from getting hooked. Tori lines are widely recommended for seabird bycatch mitigation. They benefit both seabirds and fishermen by reducing catch of unwanted catch. Tori lines are relatively simple and inexpensive making them a primary fishing modification tool for bycatch mitigation (Birdlife International). Although tori lines are the most widely prescribed seabird mitigation tool in longline fisheries, surface fishing gear makes tori lines more challenging to use in pelagic fisheries. Often fishers deploy tori lines to the leeward side of the gear where they are least effective, or do not deploy them at all for fear of hanging up on buoys at the surface jeopardizing the fishing operation. Further, the design and materials of tori lines have not been optimized via research for either demersal or pelagic longline fisheries (Melvin & Walker 2008).



Courtesy of Birdlife International

Electronic monitoring systems

Electronic monitoring systems have been proposed as a new tool designed to help observe fishing activities on vessels in which actual observers are not present. They involve the use of GPS tracking devices and technology is still ongoing to best monitor activities that could utilize this system.

II) Qualitative Results from Semi-structured Interviews

IATTC vs. ICCAT: A case study to understand the factors that drive change & progress for bycatch reduction & mitigation

Subjects included official 14 participants from the RFMO industry. These included: statisticians, biologists, NGO members, etc. The results of these interviews were meant to provide a general understanding of the issues that motivate change at RFMOs with regards to bycatch mitigation. Participants are not evenly distributed among the industry and participation was on a voluntary basis. A quantitative analysis to quantify data was utilized to better quantify responses.

Note: All responses in this report are reported as anonymous and identified solely by their affiliation to a specific organization in order protect anonymity of respondents.

Person 1

Organization: IATTC

The overall study question is to understand what drives changes at RFMOs with regards to bycatch mitigation?

1. What are the most significant or recent changes (in policy, mandates, resolutions, etc) with regards to bycatch management and mitigation at your RFMO?

Any kind of mitigation measure, like spatial management and technical gear changes, depending on what is appropriate. Circle hooks and management of fad fisheries would be some. Perhaps limiting target fishing on species of concern.

The sea bird assessment is recent and semi-completed a few years ago, however it faced many problems with retrieving data, assessing data as well as interpreting the data.

The silky shark assessment has not been completed, so nothing yet. There have been some recommendations that do not come necessarily from the assessments but from discussions.

There have been management changes that apply to seabirds but those did not come directly from the performed assessments.

For dolphins, it is directly a part of the management. The allowable catch is implemented as a management measure.

2. What were the elements of success? For example with seabirds at ICCAT and sea turtles at IATTC

The main way to avoid bycatch is through practical mitigation techniques. These should be done whether or not an assessment has been conducted. And if an assessment has been done that identifies a specific problem, the solutions might not be politically viable (like a full closure). There is a lack of feasibility for large-scale measures that are not standard mitigation techniques.

Mitigation measures like tori lines on long-liners, dolphin panels and back down procedures for dolphins, spatial closures (but not always relevant to bycatch) are main tools to address bycatch.

3. How well did the problem have to be documented to bring out any change? For example, how much data was needed to make it seem like there was an obvious red flag OR What was the role of information? For example, what were the red flags? For example, evidence of pop decline, data documentation, observers, pop impact assessments, etc.

The dolphin assessment is required and has been a part of the tuna commission for a long time. The albatross assessment came about from a personal interest in modeling protected species. The shark analysis resulted from clauses set forth by the new convention. Catch rates suggesting that the silky shark population is in trouble so IATTC took the time to look into it. For seabirds we have not done an official assessment but have done a research assessment on black-footed albatrosses. For sharks we are in the process of developing an official assessment for silky sharks.

Important to identify which species are most susceptible and apply as many practical mitigation measures as possible for that species, for example tori lines and circle hooks. From there, an assessment can be conducted and even if it is unsuccessful, it can shed light on some of the issues. Research and data collection can later be added. If it shows there is a real problem, other strategies can be applied to protect a species from collapse.

Have conducted assessments in the EP on dolphin population using PBR analysis to develop catch limits on purse seiners. These are done annually. One was done last year.
- Data, observer coverage

4. What was the role of individual nations in pushing change? Which nations were the instigators and why?

Policy incentives forced changes on dolphin issues. I think it is more dependent on the director and the staff to initiate

However, the way the commission works is that any country can request work or research done. Most focus is always on the target species. Some countries do focus on bycatch species, like the US. If a country requests an assessment (interest in bycatch), it must get done. But there are no policies in place that motivate their use as of now.

There are some vessels that do more to avoid the bycatch than others. Cultural issues come to play as well.

5. What was the role of NGO's? how loud are their voices? where does the willingness to listen to them come from?

There is the ISSF, a market incentive. That pushes for "cleaner" catch. Average consumers won't have much push, but political incentives or interests can bring about changes. The average consumer does not care about bycatch issues, but some specific consumers might make a big impact, like what happened with tuna (NGO voice).

6. How is consensus achieved among the nations (aka-the negotiators)? for example to use circle hooks, tori lines or adding observers

Agreeing mitigation response was ranked as most important and also as a huge challenge.

7. General problems? And what are the biggest hurdles in getting RFMOs to push changes?

The data is collected but often not available because those who collected it do not want to share it (data sharing issues) for either political reasons or because they themselves seek

to publish it. Also in some cases there might not be the right resources or funds available to analyze the data that is available. The data may not be in a useful format.

Very time consuming and expensive to collect and conduct data analysis.
Need more observer coverage and data.

For albatrosses, they received a funding grant for a post-doctoral student to conduct research and analysis on modeling protected species. Did not even start project before some of the data was supposed to be analyzed, took two years to get the data processed.

The dolphin analysis was the first data analysis done since there was a lot of data on dolphins previously collected by tuna commission. That was done and submitted in a timely manner.

Thoughts: Developing gear technology that can more accurately target the economically important species while avoiding the non-target species is key for future changes in bycatch mitigation.

Person 2

Organization: IATTC

The overall study question is to understand what drives changes at RFMOs with regards to bycatch mitigation?

1. What are the most significant or recent changes (in policy, mandates, resolutions, etc) with regards to bycatch management and mitigation at your RFMO?

With Antigua convention we were given a mandate to look into the sustainability of bycatch species. The dolphin issue associated with the purse seine fishery was later included in our objectives

In 2010 we started with some other species like silky sharks. We started with sharks, specifically silky sharks. Please include that the context of our RFMO was not to address bycatch issues, we were not mandated to do so. There are other gear reduction measures. For silky sharks there have been three workshops. The work started in 2007 and an assessment was conducted in 2010. Another assessment for Oceanic white tip will be released and was conducted in 2010.

2. What were the elements of success? For example with seabirds at ICCAT and sea turtles at IATTC

History has made it different for dolphins than for all other species, for dolphins there is a lot of documentation and effort to reduce bycatch to near zero. We take directive from the commissioners.

3. How well did the problem have to be documented to bring out any change? For example, how much data was needed to make it seem like there was an obvious red flag OR What was the role of information? For example, what were the red flags? For example, evidence of pop decline, data documentation, observers, pop impact assessments, etc.

We monitor the bycatch and try to estimate the total amount of bycatch and then the commissioners will decide what levels are going to be established. For dolphins there has been a push to reduce to zero. For other species we analyze some but there is no

establishment on what levels need to be established. No specific goal set or level for establishing bycatch. There have been some resolutions to try and reduce bycatch but nothing has been established

The Antigua convention mandates us to assess the status of species that are in the EPO that are associated with our fishery. Our choice to single out silky sharks involved data availability and concern with the taxa life history in general. There are many other bycatch species but sharks have a life history that makes them particularly vulnerable and this is why we chose to begin with them. Among the shark species, silky sharks are the most abundant bycatch which also means we have the most data.

If we had trend data available like Birdlife has for seabirds that would make it easier to develop scientific recommendations.

Also, having observers is very important. They provide all sorts of useful information for assessing status and also mitigation. You do not get the same quantity and quality of data from logbooks. They may not record gear characteristics or important details. They might also be filled inaccurately (reliability issues). Nuisance of filling out the data may create incentives for fishermen to lump catch data together or fill out the forms later with data that may not be accurate (human nature). An observer helps get around many of these problems. They can provide data that the fishermen may have not included either on purpose or because they might not have thought it important. Problem: They are very expensive and training is difficult and also expensive.

Also, there is a term called the observer effect- when an observer is on board, the fishing activities of the crew might go above what they normally do to minimize bycatch and "put their best foot forward." This does not happen as often without observers on board watching and documenting. It is important to reduce bycatch with measures that do not reduce catch or catch hours (key issue).

4. What was the role of individual nations in pushing change? Which nations were the instigators and why?

Our data collection comes mostly from our observer programs (purse seine fishery) in addition; countries also have their own observer programs. They are placed in the large vessels and we do not sample artisanal fisheries or high seas long-liners.

Politically, we need people to agree. We can produce great solutions and provide those to policy makers but if they are not adopted then they are not of use. Also, internationally we need to recognize that countries have different agendas. There are limitations with this as well. Also there are a number of fisheries that operate in the EPO that we have little or no knowledge about.

5. What was the role of NGO's? How loud are their voices? Where does the willingness to listen to them come from?

If we have data like the one provided by Birdlife International on other bycatch species, it's very helpful to have outsourced data.

6. How is consensus achieved among the nations (aka-the negotiators)? For example to use circle hooks, tori lines or adding observers

There are serious consequences to making strict recommendations like closing a fishery

without sure information that dictates that this is a necessary action. Having data gives us an opportunity to assess and indicate trends.

Stock assessments allow for visibility of a problem. The continuing workshops and continuous assessments allow for better estimation and more consensus building. Having an annual estimate of abundance helps collaboration and helps create a general understanding of where a population is or is heading. Will also show where mitigation is strongly needed. With many fisheries affecting a species, an assessment may help understand where to focus mitigation efforts.

7. General problems? And what are the biggest hurdles in getting RFMOs to push changes?

Generally there is reluctance in getting people together to collaborate, some feel that if they provide bycatch information they can be singled out and that might affect their fishery. Many therefore do not want to share data. There is also a computational side of it. It has helped structured models that come about from collaborative meetings. Collaboration has made people re-evaluate data collection and analysis techniques. We have only really had three meetings and only recently has bycatch been taken seriously. With more data our third meeting has been productive. We are hoping to have collaboration help with data analysis. Collaboration helps fill data gaps but we do not have a set date for when we hope to have certain assessments. Having the money to come together and collaborate can be difficult, so there are financial constraints that come into play. Not all countries have equal financial resources

Data and absence of data is huge. We might have data that is too general and not having the right data makes our job difficult. Political hurdles are also a problem that comes back to having insufficient or misinterpreted data. A big problem is also lack of data sharing, which goes hand in hand with data deficiency.

Having some sort of goal in assessment is important but we need stock assessments prior. Lack of Data. Bringing the data from multiple fisheries together is also an issue. We can't just have one reference point, it has to be integrative.

Tools that could improve bycatch management are divided in a political and scientific side. On the science side, more data is helpful. Also, sharing data is essential but in my opinion, more often than not there is insufficient data. For mitigation, more research is needed to best understand how to reduce bycatch.

Monitoring #1 importance- without monitoring even if there is a measure set in place, there is no way of knowing whether or not it is achieving its goal. You can have measures in place but if cannot monitor, we cant know (observer programs for example). Need to know that the measures that are being mandated are actually in practice and/or having an effect. Also comes back to data. Enforcement #2 (the commission has no enforcement capabilities so may not be applicable. For example if a vessel exceeds its quota say on dolphin mortality, it is up to that individual country to decide what measures are to be taken)

Person 3

Organization: IATTC

The overall study question is to understand what drives changes at RFMOs with regards to bycatch mitigation?

1. What are the most significant or recent changes (in policy, mandates, resolutions, etc) with regards to bycatch management and mitigation at your RFMO?

We have been doing a combination of several things. In all cases, there needs to be an incentive, finding the incentive is a major issue.

J to Circle hooks & training for fishermen to release turtles is an important accomplishment. These changes are discussed in our resolutions but many also came separately from consumer pressure and campaign from Greenpeace (started in Europe mainly). For issues related to turtle bycatch, we need more alliances between groups. We need a large voice like the one that Birdlife International has for birds but for sea turtles. The sea turtle groups are very dispersed. The mitigation measures to reduce bycatch for sea turtles exist, however, there is not as much pressure to implement them as there are for other species because interested groups do not share data or come together to put pressure on policy makers.

On a separate note, FAD bycatch changes have begun. March (came from consumer concern)

In the Antigua convention, we are mandated to do something about bycatch, but to determine which species is an issue on its own. We are trying to get better data on all species via observers on purse seiners.

Pressure on sea turtle issues has been growing but having data on long-liners has been a failure. Pressure on reducing shark bycatch is major now too.

2. What were the elements of success? For example with seabirds at ICCAT and sea turtles at IATTC

Need to work at international level with regards to tuna fisheries. For example, right-based management in well-organized countries works well at a national level, but does not work in places that are not well organized or in high seas.

When boats come to port, we can check if long lines are utilizing the right hooks, this is important in knowing whether or not our mandates are in place.

International outcry and push by NGO has led to changes.

Eco-labeling is an idea that could work very well but it is too idealistic and in practice it has not worked very well. Fisheries can't meet the demands of getting certified, too difficult.

3. How well did the problem have to be documented to bring out any change? For example, how much data was needed to make it seem like there was an obvious red flag OR What was the role of information? For example, what were the red flags? For example, evidence of pop decline, data documentation, observers, pop impact assessments, etc.

Having data is key. We are trying to get more observers onboard and other systems to better monitor and get data.

As data has surfaced, more changes have followed. If observers become mandatory on all fleets, there will be better data and better technology to capture data and thus bring about more change.

4. What was the role of individual nations in pushing change? Which nations were the instigators and why?

Some countries are doing much more than others, either because they care or because they have more political pressure internally or internationally. Individual companies in certain nations have adopted protocols that might affect them but can help with bycatch to avoid public scrutiny, sanctions or NGOs criticism.

Pressure gets to the commission.

Problem with this is that there are certain countries that have directed fishing on what we consider bycatch, for example on sharks.

Big companies have a large role too. If a company decides to uphold a standard, it affects the entire industry

When you get a group of countries that decide that they want to implement changes, the pressure can be very significant.

5. What was the role of NGO's? How loud are their voices? Where does the willingness to listen to them come from?

Important if they provide good data. They also can push fisheries to have a more sustainable process by imposing on them public pressure.

Huge, Greenpeace is changing the standard of import in UK and many countries in Europe. Latin-American longliner have had to replace hooks and learn how to release turtles so that their catch is considered acceptable by European consumers. For example, FADs now are a big issue and this came to the knowledge of consumers via NGO voices.

In UK, a large importer of artisanal long line fisheries, they imposed "green" and sustainable standards. This had great economic pressure. This concept came from NGO's and public demand.

ISSF has also done a lot for bycatch. This type of work is the solution to bycatch. They are developing research methods to come up with best mitigation measures. They are also pushing for better management by attending commission meetings and providing the commission with data.

6. How is consensus achieved among the nations (aka-the negotiators)? For example to use circle hooks, tori lines or adding observers)

Takes a few times. We might meet many times before an issue passes but we are advancing.

7. General problems? What are the biggest hurdles in getting RFMOs to push changes?

Consensus building is a big issue. Corruption and economic gain of some fisheries or countries vs. others makes it difficult to have a fair and level-playing field. Having stability is very important (problem- race to fish).

Also, what we are doing about investment for gear technology is miserable. Very little has been done to get better technologies out there for bycatch mitigation.

Person 4

Organization: IATTC

The overall study question is to understand what drives changes at RFMOs with regards to bycatch mitigation?

1. What are the most significant or recent changes (in policy, mandates, resolutions, etc) with regards to bycatch management and mitigation at your RFMO?

- J to circle hooks for sea turtle mitigation has been very important.
- Importance of observer coverage & data collection, well established at IATTC in comparison with ICCAT
- Antigua convention addressing more issues, big step forward.

2. What were the elements of success? For example with seabirds at ICCAT and sea turtles at IATTC

Our resolution on J hooks has been working well and we are addressing issues as they arise.

3. How well did the problem have to be documented to bring out any change? For example, how much data was needed to make it seem like there was an obvious red flag OR What was the role of information? For example, what were the red flags? For example, evidence of pop decline, data documentation, observers, pop impact assessments, etc.

We have good data since we have our own scientific department. Data has been very useful in helping us document problems to address.

4. What was the role of individual nations in pushing change? Which nations were the instigators and why?

Some nations have a much louder voice than others. Additionally, it is important to understand that the countries are sovereign and they must make changes on their own.

5. What was the role of NGO's? How loud are their voices? Where does the willingness to listen to them come from?

They can be very important, especially for providing the right data.

6. How is consensus achieved among the nations (aka-the negotiators)? For example to use circle hooks, tori lines or adding observers

We have meetings and negotiations and it is important that we are all on the same page.

7. General problems? And what are the biggest hurdles in getting RFMOs to push changes?

Having everyone agree on what needs to change and getting those changes implemented into our resolutions. Also it is important to understand that the meetings carry different weight – the current one (scientific meeting), compiles information and we have recommendations from the staff but no resolutions or changes arise from it.

Person 5

Organization: IATTC

The overall study question is to understand what drives changes at RFMOs with regards to bycatch mitigation?

Organization: IATTC

1. What are the most significant or recent changes (in policy, mandates, resolutions, etc) with regards to bycatch management and mitigation at your RFMO?

In general there has been a significant advancement with regards to bycatch. The best example is with the dolphin situation. This is pretty much a resolved issue. NGO's and environmental groups have stopped pushing us about this. Now new issues have risen. For example an important issue today is with sea turtles.

The commission and all countries associates have their own agenda. Now, sea turtles are a main issue with much progress. There is a significant effort here. We not have a database specifically dedicated to recording bycatch data on sea turtles. This is the case for the purse seiner fishery. We have 100% coverage on these vessels. On long-liners, it is still a working issue. We have even advanced here, next year we are launching an observer program on long-liners that will cover 5%. This is a small change relative to purse seiners but is a start.

2. What were the elements of success? For example with seabirds at ICCAT and sea turtles at IATTC

Having data that shows that there is a problem. This was the case with dolphins and also with sea turtles. Having a database for bycatch of sea turtles has been very progressive. Having data to tell us how much bycatch is being caught is key. We now have two important resolutions that deal with bycatch with respect to sea turtles. One is general towards bycatch but we have a specific resolution to address sea turtle bycatch and conservation. We also have two addressing shark. Another for seabirds in long lines. I think that these are successful resolutions because they are step in the right direction in addressing bycatch.

The Antigua convention has been a big factor of change since it involves bycatch mitigation since 2010. It has provisions to care about bycatch. Sharks have been a big issue lately.

3. How well did the problem have to be documented to bring out any change? For example, how much data was needed to make it seem like there was an obvious red flag OR What was the role of information? For example, what were the red flags? For example, evidence of pop decline, data documentation, observers, pop impact assessments, etc.

In the commission we have loads of good information. Especially with the information that comes from purse seiners observer coverage. This permits us to have very good information. With good information, we can easily tell if we are decimating a population and make some changes. For example with sharks we have learned that fisheries on a worldwide level are having a serious effect. This comes from information.

We are not documenting sea turtle bycatch on all purse seiners and eventually with the new 5% observer coverage on long-liners we will have more data. More data means that we will be forced to realize there are problems and thus have to change.

Where we do not have good information, like with longliners, there is less push to make changes since we are not as aware of the problems. Data leads to information which tells us where there are problems to address.

4. What was the role of individual nations in pushing change? Which nations were the instigators and why?

Yes. Absolutely. For example with dolphins, the US pushed for measures.

For changes today, purse seine countries are pushing hard for stricter measures on longliners. They feel that they have strict regulations while the long-liners enjoy almost complete freedom. Even though countries are supposed to send the secretariat information available on fisheries, this is not always the case with bycatch on long-liners since there are no regulations.

The countries that fish mostly with long lines are very resistant to changes or adopting any measures that require them to have observers or change their practices.

Mexico, US, Venezuela are big purse seine fisheries; these have been pushing for more coverage on long-liners. On the other side, Japan, China, Taiwan and Korea are very reluctant to implement any changes that can affect their bottom line.

Here the key is costs and money. If it's worthwhile financially then countries push, if not they refuse.

Also its important to note that when rules become enforceable, then fines a punishment (sanctions) follow. This is what long-liners fear.

5. What was the role of NGO's? How loud are their voices? Where does the willingness to listen to them come from?

In the commission per say, their voice is not very loud. They are allowed to present or make some form of declaration but are many times ignored. Where the willingness to listen comes in, is dependent on each country. Some countries are more willing to listen to and change from pressure from NGO's and environmentalist groups. This way, individually, some countries are more pro-environment than others. For example, in the US there is strong NGO voice. Other countries do not have the same respect for these, e.g.: Japan.

FADs are a big issue these days. There is a lot of noise being made today about the large problems that arise with FADs. This applies to problems within the industry, not just bycatch. However, we have not addressed this issue because the industry has a very loud voice. Very few measures exist.

6. How is consensus achieved among the nations (aka-the negotiators)? For example to use circle hooks, tori lines or adding observers

Takes many years. The presenters or initiators

For example for long line fisheries to have observers, there was push from purse seine countries for a long time. Countries come up with initiatives and present to the commission, here is where the process starts. Then there is negotiation and until there is general consensus, which can take a long time, the commission comes around and approves. We don't have resolutions pass without full consensus; this is why change moves very slowly. This was the case with observers for long-liners. The negotiations started at 40% coverage, but in the end only 5% was instilled. Even though the observers from long-liners will come from each nations fishery at a national level and not at a commission level.

Japan for example presented to oppose to resolutions that affect them.

When one country or a group of countries has a strong interest, they present and push the issues until they are discussed and later accepted/negotiated or rejected. It's a very long process.

Once adopted, it becomes obligatory to all.

Our resolutions and measures might not always account for all of the science that is out there, but we are doing something to incorporate the ecosystem and science into our decisions.

7. General problems? And what are the biggest hurdles in getting RFMOs to push changes?

This industry is seen strictly as a business; the biggest hurdles involve imposing any changes that can affect the business of the industry in a financial way. Resistance to change that could implicate costs for certain industry.

Some countries are very worried about conserving tuna and target species because these are part of their business, but not the same can be said about bycatch. Resistance to having changes that can affect the industry is the bottom line (like costs).

Person 6

Organization: SPC contracted service provider to WCPFC

1. What are the most significant or recent changes (in policy, mandates, resolutions, etc) with regards to bycatch management and mitigation at your RFMO?

The commission came into effect in 2004; by 2005 we had initiated an ecological risk assessment program that lasted about 4 years. The basis for that program was to recognize that bycatch is important and needs to be addressed. We do not have infinite resources so this assessment helped prioritize and understand potential issues. They also put in place obviously needed mitigation measures and a risk assessment process. In the case of sharks, we were able to identify some species that were of concern to then assess formally. Now we are doing formal population models for silky and oceanic white tips. For seabirds the risk assessment approach got us as far as to look at areas in which we need to focus on more. With them we have taken our data as far as we can but now we need further data from observer programs to better assess and analyze. We already have some mitigation in place for seabirds but we do need to be monitoring populations to know if mitigation is being effective.

For seabirds we are only looking at fishing effort and populations of seabirds around fishing effort. For seabirds it is more straightforward.

For shark assessments, it is very difficult to know levels of removals. We don't have a best estimate for catches. There are alternative hypothesis on catch based on fin trade data, observer data and other sources. We are trying to come up with a plausible range to various inputs in our models to best come up with some sort of ranges that consider catch per effort, fleets, and biological productivity of the stock. We are bringing all those together in one analysis. The problem is we do not get a single answer but it does help assess the status of the stocks. For our assessments, knowing levels of uncertainty is essential. Without them, we cannot defend any single population model. We really need to look at a broad view and incorporate uncertainty.

2. What were the elements of success? For example with seabirds at ICCAT and sea turtles at IATTC

3. How well did the problem have to be documented to bring out any change? For example, how much data was needed to make it seem like there was an obvious red flag OR What was the role of information? For example, what were the red flags? For example, evidence of pop decline, data documentation, observers, pop impact assessments, etc.

Our RFMO realized that we are not only responsible for target species but for all other species affected by fishing activities. Since the start of WPCFC, it had a stream of energy dedicated to assessing target stocks as well as other resources that focused on bycatch species. The observer program came out as a way to help complement that.

Observer programs are probably the key thing. Also, some parallel investment in approaches that do not require somebody on board, like electronic monitoring. This can definitely be worthwhile. There will be issues like "accidentally" disabling the system or there can be resistance to allow these on vessels. The technology has to be very well developed too so that there is sufficient battery life, etc.

- Vessel monitoring systems (like GPS)

4. What was the role of individual nations in pushing change? Which nations were the instigators and why?

5. What was the role of NGO's? How loud are their voices? Where does the willingness to listen to them come from?

NGO's at a recent convention argued that all long-liners should be using tori lines. The problem is even if this is agreed upon by all, making it happen is very difficult logistically (lead times, size, cost). This is why changes take a long time.

Eco-labeling is also starting to gain momentum. There is uncertainty that it works at the consumer level (most do not want to pay more or care). Also note that fishermen make a tiny fraction of the profit that the large companies make. So ecolabeling might not make a difference to the fishermen but it can and will start to create market access. At some point companies might not be able to sell their product without having a certain standard (eco-standard).

6. How is consensus achieved among the nations (aka-the negotiators)? For example to use circle hooks, tori lines or adding observers

7. General problems? And, what are the biggest hurdles in getting RFMOs to push changes?

Getting everyone to agree is a huge issue.

The order of magnitude with long-line vessels makes it very difficult (too many vessels). We already struggle to find enough people to observe the vessels that we are observing, finding thousands more and training them would be a real challenge (cost, days at sea, etc). Purse seine vessels go out to sea and fish for 30-40 days then return to port. Some

long-liners can be at sea for 18 months, so the number of vessels and also the mode of operation makes it very hard to get observers on the boats (logistical issues). The people who care about seabirds and turtles need to understand that this is why observer coverage in long line vessels is so low.

It is also very expensive. One thing that has been lacking in RFMOs in general is the concept of cost recovery where the industry should be paying individually for the cost for these kinds of activities. These costs fall on governments of which many already have huge debt and therefore do not have observer programs as a priority. They simply can't afford it. The fishing industry on the other hand is making huge profit and can easily afford observers. Expecting individual government to cover the cost of observer coverage bears a burden. Cost recovery is a policy issue that restricts our ability to manage bycatch effectively.

Getting good data from observer programs. On observer programs: it is important to understand what really goes on in a fishing boat. What they are catching, following rules, size of catch, etc. Getting this information is key. However, the method of getting this data will be different depending on vessels and/or areas. Can use video surveillance, observers, sampling at port, etc, but observers are the best way to get this information, especially for the purse seine fishery. The information tells us if they are setting on dolphins on fads, what are they doing with bycatch, etc.

The main one is the quality of information on population size and removals. Data deficiency. For most of species of fish, they are not retained except for some sharks or shark fins and therefore we need observers. We have 240 purse seine boats in the western Pacific and we have a requirement to have an observer on every vessel. If a species is being heavily impacted by some purse seine activity alone, we will have fairly good information. However, with long-liners where there can be 1-4 thousand out at a time, we just don't know. This is the biggest barrier. We would need the information (from long-liners) that can only really come from having observers on all vessels.

Person 7

Organization: SPC contracted for WCPFC

The overall study question is to understand what drives changes at RFMOs with regards to bycatch mitigation?

1. What are the most significant or recent changes (in policy, mandates, resolutions, etc) with regards to bycatch management and mitigation at your RFMO?

I know that there are certain regulations with respect to sharks. In general the commission wants to minimize bycatch as much as possible. But there is a difference in objectives that are recommendations rather than directives. In theory, the recommendations claim that fisheries should minimize bycatch. But this is very general. For seabirds there are some actual directives, like the use of tori lines, setting at night, having weights on lines, etc.

When the commission started, they knew that bycatch was an ongoing issue that would require continuing research and therefore they started addressing this issue. They started

with an ecosystem risk-assessment that then prioritized the type of work to be done. This also placed initial mitigation measures on seabirds, sharks and turtles.

2. What were the elements of success? For example with seabirds at ICCAT and sea turtles at IATTC

None yet other than small changes like boats need to carry turtle dehooker gear, tori line changes, weighted long lines, etc.

For turtles, we don't have a scientific estimate of any changes. The percentage of sharks finned and tossed back on observed boats seems to have slightly decreased. A directive was put in place, but that is only in the observed fisheries, less than 1% total long line fisheries are observed.

3. How well did the problem have to be documented to bring out any change? For example, how much data was needed to make it seem like there was an obvious red flag OR What was the role of information? For example, what were the red flags? For example, evidence of pop decline, data documentation, observers, pop impact assessments, etc.

We obtain data through direct observation programs in the long-line and purse seine fleets and through other countries observer programs that provide us data. We also get data from commission members and this is what we use to build our models.

Data collection & stock assessments are important. There is no need for a full-blown modeling effort. You can do a lot with some data. Need to start somewhere. The value is that gathering data will produce better information for management as time goes on. We have good data in the purse seine fishery but in long line fishery we do not from sheer size.

4. What was the role of individual nations in pushing change? Which nations were the instigators and why?

5. What was the role of NGO's? How loud are their voices? Where does the willingness to listen to them come from?

6. How is consensus achieved among the nations (aka-the negotiators)? For example to use circle hooks, tori lines or adding observers

7. General problems? What are the biggest hurdles in getting RFMOs to push changes?

Lack of data is the biggest problem since without it we cannot provide the correct scientific advice. Data is a very limiting factor. Sometimes cost. Cost is a factor in collecting data and having the right people in the field analyzing it. Some political hurdles like people not wanting to share data or differences in opinions on what the data means (driven by political stances) but this is not always the case.

Policy incentive in that bycatch is an issue that is not going away and something needs to be done (many issues to address). Some might be legal. Better management needs to be in place to motivate assessments.

Agreeing on management objectives is the most important hurdle for getting anything passed on bycatch mitigation. After that, possibly monitoring and enforcement.

But it is important to agree on effective measures. If you agree on a weak measure and you implement it won't work. If you agree on a good measure and don't implement it, there won't be a change. Similarly, if you can't agree, no changes. We need consistency in data collection as well. Having efficient video monitoring for example would be very helpful.

There are economic incentives in place now that deter companies from fishing sustainably since they do not pay to fish the high seas and they make a large profit, they also lobby the government, that is something to keep in mind.

Person 8

Organization: ICCAT

The overall study question is to understand what drives changes at RFMOs with regards to bycatch mitigation?

1. What are the most significant or recent changes (in policy, mandates, resolutions, etc) with regards to bycatch management and mitigation at your RFMO?

ICCAT abides by the convention whereby we manage tuna and tuna-like species in a level of catch that can sustain the populations into the future. It is a fairly old convention so there is no mention of the issues we have been discussing today (at NOAA Workshop - like targets, limits, and the precautionary approach. There is conversation to include ecosystem management approaches, precautionary approaches and using limits as apart of the convention.

We use tools like MSY and catch information to meet our objectives. Recently they (management) have asked us scientists to look into reference points and advise them on the use of reference points. We are moving in that direction but it has not been implemented as a formal tool. Bycatch has only been recently documented in our RFMO.

For ICCAT we did perform an impact assessment for sea birds in conjunction with Birdlife International. We have also conducted some stock assessments on blue sharks (for some it may be target for others as bycatch). Regardless, we did conduct a full stock assessment on blue sharks. We also did a full stock assessment for short fin mako and porbeagle sharks.

Shark assessment for blue and short fin mako 2008

Porbeagle Shark 2009

Seabird assessment started in 2007 and finished in 2009

This year we will start an impact assessment for sea turtles and another for short fin mako

In 2009 when we finished the seabird assessment, we made a recommendation to the commission to add additional mitigation measures, at least two additional mitigation measures. Initially they did not agree. Not until 2011 with more information, the commission approved the recommendation of the scientific committee. It took three tries. It many times takes a long time to make changes happen. You have to be patient and go little by little. We call it bycatch fatigue- if you inundate decision makers with changes they get overwhelmed; it is better to go slowly. It goes farther.

I am able to see both sides of the coin since I work on the scientific committee but I also attend the committee meetings. I see how the commission reacts to our recommendations. This has been very useful. It is important to write our scientific advice in a way that the decision makers can understand it. Communication is key. If our advice is not firm enough, it does not work and gets ignored. We need to explain things simply and directly, like DO a, b and c.

2. What were the elements of success? For example with seabirds at ICCAT and sea turtles at IATTC

No specific mentions of management goals for bycatch species are defined; the convention does not include any language or well-defined goals that relates to non-target species. There is common knowledge that they should be protected and bycatch should be reduced, however, no real measurements yet. We have taken on a general goal to reduce bycatch, but no specific numbers or measures. We are in the very early stages in terms of bycatch management.

The issue of bycatch in RFMOs is relatively new. No one was talking about it 20 years ago. The one big issue was the dolphin safe campaign in the Pacific. Not in the Atlantic. Sea turtle issues have been around for a while but only recently and at a slow pace are they being addressed. Many countries are evasive about these issues. It is easier to avoid than it is to accept that bycatch is an issue. There is a particular view or general concept that anything done to protect non-target species will affect target catches.

The availability of mitigation measures that are proven to be effective are essential tools for managing bycatch species.

Observer programs are important but only a small percent of the fleet is observed. It is expensive and fleets do not like having scientific observers on board.

3. How well did the problem have to be documented to bring out any change? For example, how much data was needed to make it seem like there was an obvious red flag OR What was the role of information? For example, what were the red flags? For example, evidence of pop decline, data documentation, observers, pop impact assessments, etc.

For the blue sharks, the stock assessment results showed two stocks in the Atlantic and both in fairly good shape, so the scientific committee recommended no changes. For short fin mako, we had problem with the data. It did not allow for management benchmarks. The lack of data made it impossible to recommend catch limits to the commission, therefore, the advice simply asked for the stocks to be maintained at current levels until more data was collected. One of the problems we have with shark data is that the catches are very poorly recorded. In some cases, sharks are reported without any species identification, they are reported simply as sharks. There is also no data for coastal artisanal fisheries. Also, biological parameters for many species are not known so traditional stock assessment models do not necessarily perform well and therefore we can not trust the results from the model. Even if sharks are landed and sold, data is very deficient and poorly reported. It is also expensive and differs a lot on a country-to-country basis. Asian fleets have larger fleets; higher bycatch rates on sharks and often have poor observer programs. Also keep in mind that some fleets are out at sea for 4-6 months and having an observer program on board for that long is very difficult (not feasible really). High seas fleets (long-liners) have specialized systems with freezing vessels. They stay out at sea and send catch once vessel is full and continue to stay out fishing the high seas for many months at a time.

The amount of fishing in the Atlantic in the 70's is nothing compared to what we have now. There have definitely been some changes. There is less and less catch and the economics of fishing is not what it used to be. Many stocks are depleted.

Data from assessments helps give some reliability. The mood is changing, it used to be a very reactive system and it is moving towards a more proactive one. Management is slowly becoming more precautionary. But having a tool like a population impact assessment that shows that there is problem is a very useful tool.

4. What was the role of individual nations in pushing change? Which nations were the instigators and why?

Sometimes managers and fishermen fail to see that dealing with bycatch can be beneficial for their bottom line. For example, seabirds. Seabirds take bait that will no longer be useful for catching fish; this is also the case with many marine mammals in long lines. If bycatch is minimized, it could benefit fishermen, managers and bycatch simultaneously. In some cases, there is an economic value but not all understand it. Many countries want to deal with bycatch because "it is the right thing to do" a moral issue. Others want to deal with bycatch because they do not want to be seen in a negative light internationally, political issues. This applies in the Asian market (for shark fins, etc). Also NGOs have brought up bycatch issues to the public and therefore they have put pressure on fisheries and governments. Environmental NGO's certainly have put pressure on governments and managers to do something about bycatch. Whether or not consumers have an effect is questionable. Without NGOs it would have probably taken a lot longer for managers in RFMOs to address certain issues. It is also important that the NGO's are professional and that they present information clearly and not simply oppose fishing activities all together. Birdlife was very effective in convincing us that there was an issue that needed to be addressed.

5. What was the role of NGO's? How loud are their voices? Where does the willingness to listen to them come from?

Birdlife International was a big motivator for sea birds. They did a very good job at pointing out that there was an issue. For sharks, there was pressure coming from some countries, this pushed us to conduct the assessments. Under the leadership of more conservation oriented countries (e.g.: Norway, USA, Brazil, Uruguay, Canada for the most part, South Africa) we were pushed to conduct the sea turtle assessments. Really depends on each country focus.

6. How is consensus achieved among the nations (aka-the negotiators)? For example to use circle hooks, tori lines or adding observers

In ICCAT the great majority of decisions are done after hours and in hallways. They are not done at the big table when everybody is seated. Countries present proposals with certain management recommendations and many times the proposals get discussed behind closed doors. When there is some agreement or there is more than one agreement on the table, it can open the floor for discussion. Here is where the negotiation can start. There is a lot of politics involved. Bottom line, even though there is a voting majority, this is avoided at all costs. If a proposal is to pass, we do it by general consensus whereby most, if not all, need to agree. If there is strong opposition by one or two countries, the proposition is usually withdrawn.

For seabirds we increased mitigation measures but it took three tries. Mitigation measures were agreed upon since we had good information from studies from organizations such as Birdlife International. Now they are in place and we expect mortality in seabirds to decline. The only way to really know is if in the future we look at this issue again.

For short fin mako no changes yet, but we will know this year when we conduct the new assessment. This will help benchmark.

For blue sharks, no changes.

They have just adopted a formalized system for collecting bycatch data. Many countries document bycatch data but it is not reported in a synchronized manner and it makes it difficult to understand.

7. General Problems? And what are the biggest hurdles in getting RFMOs to push changes?

Agreeing on management objectives is the most important issue; we need to agree on goals to do anything in response to bycatch issues.

Insufficient data is important, for example when we did the seabird assessment we did not have formal mechanisms to evaluate the uncertainty in the data. We knew there was a lot of uncertainty in the information but it was unquantifiable uncertainty. We could not estimate a confidence interval around the estimates. We cannot tell how many birds are being killed but we were able to tell that ICCAT fisheries were having an impact on seabird populations, and in this case, it was enough for us to push mitigation measures.

Also, for non-target species getting measures passed may be very difficult. Enforcement can be very difficult as well. Improvement of data collection and reporting for artisanal fisheries is also very important to better understand the changes that are needed.

The other, and I speak only from ICCAT (we are not as advanced as IATTC); we do not have the knowledge that is available to conduct the impact assessments. We are moving in that direction but we do not have enough knowledge or systems in place to conduct the proper impact assessments.

Another is we do not have strong enough collaboration with experts in the field. This was the case with the seabird assessment. Without the expertise of Birdlife International we would not have had the information necessary to do something about the problem.

It is also difficult to make impact assessments because we struggle to give management advice when we do not know what the goals are. Scientists cannot define what management advice should be. Our goals might be different from those in management. We can provide our advice but for example, with non-target species, management rarely has a goal, therefore, deciding what to do without a clear goal makes it very difficult.

Data limitations as the most important followed by lack of expertise. Cost is not really that big of an issue since we usually utilize data that is already available and it is not expensive to get a group of specialists together to decide on managerial goals. It is only expensive if we have teams out in the field collecting the data, but we mostly rely on existing data. For example Birdlife International.

Once you have made an impact assessment, it must translate into advice and you must create mitigation measures that can be utilized. It does not help to claim that mortality needs to be reduced without specifying how you are going to do so. Studies of mitigation measures and their effectiveness are essential tools.

An extensive and mandatory observer program that includes the collection of bycatch data should be a priority. Another priority is that there is enough funding for bycatch collection and analysis of the data.

The issue of bycatch for us is relatively new and we have found resistance but we are slowly moving in the right direction. Not quite as fast as some would like but in the last two or three years there have been good changes. This year we accepted a sea turtle proposal. Eventually we will catch up with the other RFMOs with respect to bycatch issues and mitigation measures.

Person 9

Organization: Former ICCAT

The overall study question is to understand what drives changes at RFMOs with regards to bycatch mitigation?

1. What are the most significant or recent changes (in policy, mandates, resolutions, etc) with regards to bycatch management and mitigation at your RFMO?

In ICCAT there have been some big changes in past 4 years. Prior to 2007 we only had a few prohibitions such as the prohibition of feeding as measure regarding bycatch. After 2007, changes started to happen.

- Observers are very important

From 2009-2011 we have "protected" species but compliance is not at its best and we need to run new ecological risk assessments to get better data.

ICCAT has also adopted (last year) data documentation on sharks as a mandatory measure, progress here. We don't allow vessels to catch without providing data. To do this, we need CITIES to track

He has been very involved as representative delegation of Brazil. In 2006 proposed the creation of specific group to deal with sharks. This was the first significant change in ICCAT. This proposal came from Brazil (he led it). Fabian chaired this program. At same time, the ecosystem group in ICCAT started to discuss the use of ecological risk assessments for seabird bycatch and use of ERA and about same time

2. What were the elements of success?

Observers are crucial. We need to be getting countries on board. More compliance/monitoring and respecting measures adopted by RFMO. Also, having more sanctions (like controlling export of shark fins). Need to manage illegal fishing too.

The bycatch working group in ICCAT used to just list species. In 2004 we did the first stock assessment for blue sharks and after that, we created a specific group for sharks because ecosystem group was overwhelmed and we realized was a need to have a department to deal with sharks

We could only have stock assessments for blue and mako sharks because we had data, for other sharks we had NO data so we could not do much.

Proposed that we needed a second stock assessment for these species while also do an ecological stock assessment for shark species. THIS was turning point
ICCAT reluctant to do this

Main turning point was to have assessments to have measures.

In 2008 we proposed to prohibit the taking of thresher sharks and had no success. There was reluctance from fishing nations that fin them. We brought the issue back in 2009 and then finally we were successful. We included big eye thresher as part of mitigation measures. This was only possible from having ecological assessments. From that we added hammerhead, mako, etc.

Compiled ecological risk assessments to make changes in fisheries that affected most vulnerable species

This is why it is important to continue to monitor species so we can follow up their condition

All other species, which we don't have data then we base our decisions on already available data.

3. Drivers of change? How well did the problem have to be documented to bring out any change? For example, how much data was needed to make it seem like there was an obvious red flag OR What was the role of information? For example, what were the red flags? For example, evidence of pop decline, data documentation, observers, pop impact assessments, etc.

List of vulnerable species came out, and this us him to push policy-makers to adopt measures to address this. Scientifically concrete evidence helped him bring to the commission a need for change.

Also, using science tools like ecological risk assessments has been crucial to prove that there was need for change. We need to understand the situation to show what is happening and understand the changes that are needed. SCIENCE was crucial for consensus building. This was clear with big eye thresher

What was the role of information? SCIENCE WAS KEY, need observer programs and data to understand the ecosystem and implement measures accordingly.

Main driver were individual countries that started to push for bycatch reduction. Why? For different views and reasons.

4. What was the role of individual nations in pushing change? Which nations were the instigators and why?

US, Brazil and Canada respect measures but there are states that do not respect measures indicated by our convention, etc. Brazil has been in some ways at the forefront for the adoption of measures to conserve shark species. We understand that the conservation of sea birds, sea turtles and sharks are necessary to balance ecosystem to allow for fishing to continue. In 2007 nothing had really been done for bycatch, from there has been a lot of change and measures adopted since then.

We have investing in getting better.

Individual nations pushing change are a significant push.

5. What was the role of NGO's? How loud are their voices? Where does the willingness to listen to them come from?

NGO has been crucial for changes. Change is driven by noise, by the neighbors, by countries that pressure us. NGO have helped significantly. For example, Birdlife international with regards to seabirds and PEW & Oceana with regards to Sharks.

6. How is consensus achieved among the nations (aka-the negotiators)? For example to use circle hooks, tori lines or adding observers

This is very difficult. In fact, this is the greatest challenge by far. Key aspect in his chairmanship was to show that there was no future for ICCAT and the industry without using scientific advice to run the management. NEED TO LISTEN TO scientific advise.

7. What are the biggest hurdles in getting RFMOs to push changes?

Achieving consensus and getting the correct data to provide the right solutions. However the most important NEXT STEP is getting measures implemented and complied with. Here lies the largest issue. We can develop new measures but without implementations there is change happens. We should worry more about implementation/compliance than developing new measures.

Challenge is to get every country to abide by regulations and compliance. Compliance needs to come internally from each state following our recommendations. They need to make this into laws. The commission is doing its job but states need to now do theirs. Compliance is necessary and states sovereignty and trust is essential. NGO HERE can play a huge role. Most of the time, states that do not comply with recommendations from lack of capacity not lack of desire to comply. We need to help underdeveloped countries to implement these obligations. ICCAT needs to invest resources and have more international aid. The commission needs to go state by state to examine individual processes. We are doing this now. Commitment is key. We need to aid in the development of tools that can help them commit.

Compliance and capacity building biggest challenges

Illegal activities and targeted fisheries that are poorly managed and data documentation is poor represents a big issue. Finning is a huge problem to manage, need EU to adopt measures of reduction, these need to be mandatory measures. Our system is based on trust but cheating happens. We depend on states doing their duties and abiding by rules. This is why compliance is most important: need more observers on board, have mandatory 5% and Brazil 10%. But need more. Observers are key!

Person 10

Organization: NOAA & ICCAT

The overall study question is to understand what drives changes at RFMOs with regards to bycatch mitigation?

1. What are the most significant or recent changes (in policy, mandates, resolutions, etc) with regards to bycatch management and mitigation at your RFMO?

The first ICCAT subcommittee in environmental issues that became a bycatch working group began 1994. This is where bycatch issues started to arrive. A formal committee on bycatch started in 1995.

Sharks even have their own working group; even stock assessments are conducted for such.

In 2005 they (sharks) joined ecosystem working group and has been this way since. The work on bycatch mitigation and ecosystem management is still in infancy even though mandated now in ICCAT. However the issues still need to get off the ground. The first shark assessments began in 2008. Seabird assessment was first non-fish bycatch assessment. In 2009, Birdlife International and ACAP presented to the committee on the impact of pelagic seabirds in long line fisheries and showed that bycatch was very high. Recommendations were made to the commission level and the commission determined formal recommendations. Commission asked scientists to assess formally seabird impact in 2009. This was done with ACAP.

Results of this showed that seabird bycatch was heavy in long line fleets; outcry followed and there was a push to mitigate.

This year, starting with sea turtle analysis with data we get via an outside contractor. In July will be having a meeting about this and later another one for 2013 ecosystem meeting. Then will report to commission to recommend some action or mitigation measures.

ICCAT is motivated from directed species but they are affected by lists of species that are listed with CITES because it affects trade. Species that are endangered or listed and can affect international trade are taken into consideration.

ICCAT mandates MSY for directed catch but also have an objective to minimize bycatch and it seems that they are becoming more proactive in asking for mitigation measures for bycatch species as long as these does not affect commercial value of directed fisheries.

For example circle hooks, had to be analyzed to see how this would affect the directed fishery. As a whole we need to find measures that do not affect directed fishery.

There is a whole list of recommendations that already exists but they lack the motivation or narrative on where these things need to happen. ICCAT wants to mitigate bycatch but there is no narrative on how to prioritize or go about making changes to achieve this.

E.g.: how did this become a priority? A lot is missing from the doc's.

2. What were the elements of success? For example with seabirds at ICCAT

We had some data from our assessment but the scientific working group found out the blame of high bycatch was most noticeable from the data that came from nations that are better regulated and therefore have better data. This makes it unfair. It does not mean that these are the countries with most blame, might just mean that some countries have more data than others. With that we realized that we did not have a lot of data so focused on using ACAP's data to identify specific mitigation measures that were easy to implement and cheap that would still be effective for fishing. We realized that the best way to identify the problem was to learn from the data available from the experts in the field. This did not blame individual nations, which is important. ACAP has been very successful at getting recommendations up to commission level.

3. How well did the problem have to be documented to bring out any change? For example, how much data was needed to make it seem like there was an obvious red flag OR What was the role of information? For example, what were the red flags? For example, evidence of pop decline, data documentation, observers, pop impact assessments, etc.

ACAP provided good data from their involvement. Because we allow scientific observers in meetings, this allowed for them to present their info. In this way, data proved to be key in motivating any changes. Data showed that there was a clear problem.

4. What was the role of individual nations in pushing change? Which nations were the instigators and why?

There is definite roles in some nations but don't know which ones specifically. For sea turtles, commission asked for assessment on sea turtles. The US pushed the commission to have work done, but some others were initiators too.

5. What was the role of NGO's? How loud are their voices? Where does the willingness to listen to them come from?

Huge. We allow them into the meetings so they were able to present good info that was used to make changes.

ICCAT is a transparent organization so any group that wishes to attend the meetings can. This is where they can present the data that can lead to changes.

6. How is consensus achieved among the nations (aka-the negotiators)? For example to use circle hooks, tori lines or adding observers

Starts in sub-committee, circle hooks is on the line now but there is contradictory scientific evidence, which makes its difficult to implement. Science needs to be solid to be weighed into changed. Consensus super important. We need to build in the working group, a body of knowledge to support recommendations, this will help build consensus among nations. The science and papers need to be strong and one-sided. Some say helps, some say doesn't then we cant push change.

Bargaining outside the meetings very important.

7. What are the biggest hurdles in getting RFMOs to push changes?

Largest is the lack of biological research available that informs the scientific decisions. We rely on others science making it very limiting or us. We added a bycatch coordinator to do scientific literature finding to help. We don't have much observer coverage that makes getting data very difficult and therefore making the right recommendations even harder. Some data is also retained so we don't have enough to work with.

Challenge for getting observers is cost really. The fishing industry needs to push it more, individual nations should push it. Fishing industry bears the cost of this and they don't want to. To some degree the nations just don't want to release their bycatch data, don't want to admit the issue to avoid stricter regulations.

Quality data is key in finding out the hot spots, this affects fisheries and that's why they are reluctant to share. Unwillingness to have data be well known.

Person 11

Organization: ICCAT

The overall study question is to understand what drives changes at RFMOs with regards to bycatch mitigation?

1. What are the most significant or recent changes (in policy, mandates, resolutions, etc) with regards to bycatch management and mitigation at your RFMO?

ICCAT has been somewhat of a pioneer in this arena. Towards the end of the 90's start of 2000 we started adopting resolutions with respect to bycatch mitigation. Started with sharks then seabirds. Lately we have been working on sea turtles. Also pushing more

observer programs for better data. In the last few years, the push for bycatch mitigation has been exponential. In 2001 we adopted a resolution on sharks, another in 2002 but in the last few years for example in 2011 we have had three resolutions that relate to bycatch vs. one or two in 2001 with less weight.

2. What were the elements of success? For example with seabirds at ICCAT and sea turtles at IATTC

Having data is very important. A lot of fishing is not legal and it affects the industry. Science has to be well documented to provide good recommendations that can be adopted, that are feasible politically.

Seabirds are a great example. Birdlife international presented great data to us, because don't have internal experts in birds or turtles, we might not have good info so its fundamental to have experts in the field give us the info and dynamics. Took them a few years, started in 2006 with data but it took 3 years and came from those with the best knowledge in the field (birdlife international). In 2009 we knew we had measures of bycatch on seabirds and that the industry was clearly having an effect.

Resolution in 2009 brought upon tori lines as a very important measure

Last year it has become established but also we have added two other measures- weights on the line and night fishing in some areas.

We have a mandate that runs until 2015 to understand the effects of these measures.

3. How well did the problem have to be documented to bring out any change? For example, how much data was needed to make it seem like there was an obvious red flag OR What was the role of information? For example, what were the red flags? For example, evidence of pop decline, data documentation, observers, pop impact assessments, etc.

Upcoming trends on importance of ecosystems have had an impact. Pressure from NGOs has pushed us to be more responsible and work more and more efficiently.

Science here plays a large role.

This is largely due to the work done by NGO's and environmental groups. They have prompted reactions in the commission and have contributed to a great deal of pressure to deal with bycatch issues.

4. What was the role of individual nations in pushing change? Which nations were the instigators and why?

Countries that come together as a group have more weight and are able to push towards changes more effectively. When one or two countries are irresponsible, makes it very difficult to manage.

5. What was the role of NGO's? How loud are their voices? Where does the willingness to listen to them come from?

NGOs have been the main driver of change. They are causing reactions among the industry and cause the majority of change. This has political effects. Definitive changes in seabirds came from voice and push of NGO and environmental groups such as Birdlife International.

6. How is consensus achieved among the nations (aka-the negotiators)? For example to use circle hooks, tori lines or adding observers)

This is long process. Political deficiencies used to be very prominent and we had little consensus. Lately, especially with species of concern, there has been more “coming together.”

In the annual meeting, science committee presents data and provides advice. This is the launching point to start negotiations.

In an arena with a lot of nations, the negotiations may be very difficult but in the end, it depends on individual objectives and how rational the advice from science is and can be achieved.

There are clear evolutions in certain nations, as their objectives change like EU, so does the consensus.

7. What are the biggest hurdles in getting RFMOs to push changes?

Multiple hurdles. Some countries out of principle do not want to change. Others cant because of financial constraints or can figure out the way to implement change.

Only the operational measures really get through, this is why we were able to implement changes with seabirds and mitigate.

Cultural hurdles from certain countries and traditions present a huge challenge- aka with sharks & dolphin fishing

Radical changes have come about in the recent years and I do think there is hope to implement important and forward thinking measures.

Person 12

Organization: Sharks Advocates International & Shark Alliance & Ocean Conservancy

The overall study question is to understand what drives changes at RFMOs with regards to bycatch mitigation?

1. What are the most significant or recent changes (in policy, mandates, resolutions, etc) with regards to bycatch management and mitigation at your RFMO?

ICCAT 2004 international ban on finning (this opened the door)

Shark initiative (ICCAT) ahead of other RFMOs

Most RFMOs followed so its set the stage

2009 prohibit thresher fishing (ICCAT) – set stage for other species like oceanic white tips

2. What were the elements of success? For example with seabirds at ICCAT and sea turtles at IATTC

- Breakthrough because it was the first even though many countries did not want to deal it. But we wont know how effective until we assess this year

- Has helped open door but not a lot of enforcement has been made

- RFMOs do not use the gold standard, still using the 5% fin to carcass ratio

Real management measures like closures, quotas, etc are non-existing and are very necessary.

Need for more sustainability is important.

3. How well did the problem have to be documented to bring out any change? For example, how much data was needed to make it seem like there was an obvious red flag OR What was the role of information? For example, what were the red flags?

For example, evidence of pop decline, data documentation, observers, pop impact assessments, etc.

2004 assessment for Mako sharks showed evidence of over-fishing problem (IATTC & ICCAT measures from this in 2005)

2007- re-clarified

Members have now committed to reducing

With blue sharks and other important commercial species we lack a lot of data, so implementing change is difficult

Ecological risk assessments have been somewhat useful.

Nothing has really led to concrete measures for example quotas or prohibition

Not much has been done to understand many of the commercial species since countries that fish them are evading these issues.

4. What was the role of individual nations in pushing change? Which nations were the instigators and why?

The US is one of the leaders, most comprehensive shark management & data collection. From this came the shark-fining ban.

Generally the main opposition comes from China, Japan and Korea. The EU has bad RFMO measures, especially Spain & Portugal. EU now has initiatives and a shark plan, especially for Oceanic White Tip.

5. What was the role of NGO's? How loud are their voices? Where does the willingness to listen to them come from?

Shark issues are on forefront of NGO these days. They have loud voices capable to impose changes but it is a working process. Public concern is growing.

We need more NGO voice in the problem nations; more NGOs in Asia are key. People need to be educated. Only western NGOs are really participating in RFMO meetings, we need more international NGOs pushing these issues and talking to Asian delegations in nations.

6. How is consensus achieved among the nations (aka-the negotiators)? For example to use circle hooks, tori lines or adding observers

Initial exchange of views to begin. It starts a process and side meetings and working groups exist to come up with "compromises" to get all to agree. Still, countries can deny.

7. General problems? What are the biggest hurdles in getting RFMOs to push changes?

A combination between political and compliance being a big issue. Also, to implement changes we need consensus and the countries rarely agree. Especially with issues on sharks with Asian countries.

Open-ended exemptions are a huge issue as well. There can be language that dictates a measure but with exemptions and lack of monitoring or data collection there is no way to know what is working and what is not.

Opposition is mostly coming from Asian countries and some developing countries, but mostly Asia who targets vulnerable species, also Spain (blue shark as main target, also mako).

EU needs to get on same page as US for fining regulations. This will lead to better data collection and push other nations to move towards changes.

Enforcement is key. We need evidence that the measures in place are working.

Person 13

Organization: ICCAT & ISSF

The overall study question is to understand what drives changes at RFMOs with regards to bycatch mitigation?

1. What are the most significant or recent changes (in policy, mandates, resolutions, etc) with regards to bycatch management and mitigation at your RFMO?

The sea bird resolution at ICCAT represents an important stepping-stone for bycatch mitigation issues.

Also, the prohibition for sharks at ICCAT have been very progressive
Thirdly, the mandate to keep all tuna (full retention) on board is huge for bycatch mitigation of target species

As far as sea turtles, the resolutions have been very weak. Little has been done. The resolutions dictate weak measures and do not require data intake or mandate reporting so it is impossible to know if any measure is working.

2. What were the elements of success? For example with seabirds at ICCAT and sea turtles at IATTC

Having Birdlife International along with ACAP for seabirds → provided data that ICCAT did not have

Resolutions and changes are successful when there is a will from several countries to push something through.

3. How well did the problem have to be documented to bring out any change? For example, how much data was needed to make it seem like there was an obvious red flag OR What was the role of information? For example, what were the red flags? For example, evidence of pop decline, data documentation, observers, pop impact assessments, etc.

Obvious population declines that are observed when fishing for target species or observed in catches of non-target species are a huge indicator. Also a reduction in an area where certain species are caught is a good indicator. For sea birds at ICCAT, having such rich and well-presented data was important.

4. What was the role of individual nations in pushing change? Which nations were the instigators and why?

Individual nations have a huge role to play in any changes. Individual nations are the one's that start the resolutions and that push them through.

5. What was the role of NGO's? How loud are their voices? Where does the willingness to listen to them come from?

Also very important and on a country-to-country basis. You could say that countries interested in conservation issues use NGO's and environmental groups as a catalyst to push their agenda.

6. How is consensus achieved among the nations (aka-the negotiators)? For example to use circle hooks, tori lines or adding observers

Every individual country comes to the commission with an idea and an agenda depending on their priorities. From here, they negotiate the resolutions that are going to expire and/or propose new ones. For bycatch, there is much less priority but there is always a trade off in negotiations (mostly outside of the meetings, in corridors)- countries that want to push something meet individually then come together to increase their chances and push their changes. Negotiations occur inside the committee meetings but mostly outside, more transparency here since it's more secluded.

7. General problems? What are the biggest hurdles in getting RFMOs to push changes?

Negotiations are very difficult. Countries have different agendas and there are overlapping fisheries.

Person 14

Organization: PEW

The overall study question is to understand what drives changes at RFMOs with regards to bycatch mitigation?

1. What are the most significant or recent changes (in policy, mandates, resolutions, etc) with regards to bycatch management and mitigation at your RFMO?

At least now we are looking at sharks, even from the staff. Progress in general is being made but slow. Antigua has been important to bring bycatch to light. Resolutions on bycatch are a base but don't do as much.

For sea turtles, observers have been key, without them there is no enforcement. Long liners need to provide data and uphold by these measures as well. But the will to do it is low by the industry.

2. What were the elements of success? For example with seabirds at ICCAT and sea turtles at IATTC

In IATTC turtle bycatch efforts and shark efforts

In ICCAT similarly but less control, trying to do more but have not been successful

3. How well did the problem have to be documented to bring out any change? For example, how much data was needed to make it seem like there was an obvious red flag OR What was the role of information? For example, what were the red flags? For example, evidence of pop decline, data documentation, observers, pop impact assessments, etc.

Precaution is very important, especially for us as an environmental group. Data is necessary but we don't need it all to know that mitigation is necessary. Some need to be more sustainable is obvious don't need a full stock assessment. We need to account for the idea of ecosystem approach rather than just consider the money that comes from the fishing industry. IATTC has been doing more to think about other species outside the target species.

4. What was the role of individual nations in pushing change? Which nations were the instigators and why?

Some countries care about the industry above all, and getting those to change is nearly impossible.

Countries that want to make changes with regards to bycatch are important. Size and power is important. Big players: Japan, US, EU

The Latin American countries are more involved in the importance of commerce

5. What was the role of NGO's? How loud are their voices? Where does the willingness to listen to them come from?

We recommend and provide scientific information; from there the decisions are made at commission level.

6. How is consensus achieved among the nations (aka-the negotiators)? For example to use circle hooks, tori lines or adding observers

In the hallways or bilateral reunions. The large commission meetings are not as important. Meetings pre-reunion with already existing reunions bring the changes.

7. General problems? What are the biggest hurdles in getting RFMOs to push changes?

Agreeing on changes and getting through the political red tape to achieving consensus. All need to agree, if one nation strongly opposes, then implementing any sort of change becomes impossible.