WPI

A Recreational Fishing License Program:

What's the Catch?

Structuring and Managing License Fees to Achieve Financial Sustainability

An Interactive Qualifying Project submitted to the faculty of

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Abstract

Following the development of recreational fishing license programs throughout the United States, Puerto Rico is working to implement their first program. Implementation would help Puerto Rico both to collect data and funds that can be used to combat overfishing and increase fishery access. Drawing on the results of surveys and interviews, this project provides Puerto Rico's Department of Natural and Environmental Resources with recommendations to establish license prices to best financially and environmentally manage fisheries.

Executive Summary

Fisheries management is the most effective method to maintain fish stocks, minimize bycatch, and overall reduce overfishing (Marrero, 2012). One example of fisheries management is recreational fishing license programs. These programs allow for fisheries managers to enforce safe catch limits, control bycatch, monitor the industry, and protect the ecosystem (Beddington, J. R., & Rettig, R. B., 1984). Many fisheries management agencies depend on revenue from fishing licenses to maintain their programs (Hunt et al., 2017).

The National Oceanographic and Atmospheric Administration (NOAA) created a National Saltwater Angler Registry in 2010 to better collect data on how recreational fishermen affect fish stocks. State environmental agencies that did not meet the standards for data collection that NOAA required, were encouraged to develop recreational fishing license programs. Following the development of recreational fishing license programs throughout the United States (US), Puerto Rico is working to implement a program. Implementation would help Puerto Rico to collect data and generate funds that can be used to combat overfishing and increase fishery access. The project's research goal was to assess recreational fishing license programs throughout the US to create a recommendations report specifically for Puerto Rico that will update their license fees. Our research question was: How does an environmental government organization structure and manage license fees to be financially sustainable?

We conducted online research on the price and length of recreational fishing licenses across the US. In addition, we contacted fishermen to gain their personal opinions on the pricing of the recreational fishing licenses. We created a quick survey that contained questions that gave us fishermen's general opinions on licensing fees. We totaled 190 survey responses from fishermen who have licenses in 33 different states. To acquire additional information not covered from our research and survey, we held key informant interviews with members of environmental agencies in mainland states to see what they have done to help recreational fishing license programs. We interviewed 9 different state environmental agencies.

Through surveys, interviews, and research, our project team identified necessary procedures to update license prices and the challenges faced by an agency surrounded by structuring the license fees. We discovered that recreational fishermen are willing to financially support fisheries management through the purchase of a recreational fishing license. Furthermore, there is an aging demographic in the recreational fishing industry and recreational fishing license programs need to focus on having a transparent relationship with the public. The Arkansas, Michigan, and Nantucket interviews revealed that there are struggles with maintaining transparency with the public since it is difficult to reach the entire desired demographic.

The reasoning and process of determining the prices for recreational fishing licenses varies between all states. Interviews with different state agencies and research conducted by the group provided varying responses for how states determine their fishing license prices. In addition, Rhode Island and Massachusetts have different methods of how they attached different

fees onto the existing recreational fishing license fees. The lengths of multiple day recreational fishing licenses also vary from state to state. Through our research we collected, we discovered the different lengths of recreational fishing licenses that are available across the US.

There are two general options to manage license fees and distribute their profits: placing revenue in the general funds for the local government or use a restricted receipt account within the department. Our interviews and our survey revealed new trends regarding how to manage and distribute license fees. Additionally, recreational fishing license fees are distributed differently in marine and inland projects due to public desires. The two ways that can increase the likelihood of a fisherman purchasing a license are: a simplified buying process and knowing how their funds are being allocated. The recreational fishermen surveyed across the US, personal research, and our interviews provided evidence for our findings.

We then created a recommendations report that we sent back to Puerto Rico's Department of Natural and Environmental Resources (DNER). The report can be used for any other state or country who wishes to create or update recreational fishing license fees. There were 10 recommendations in total that were grouped into three different categories: the structure of license fees, managing license fees, and achieving financial sustainability.

Our interview with Mr. Armstrong of the Massachusetts Division of Fisheries and Wildlife accurately summed up the process of fisheries management as "Managing a fishery is like managing a forest, except it's always night and trees move".

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Disclaimer

This Interactive Qualifying Project was created as a requirement necessary to fulfill a Bachelor's of Science degree from Worcester Polytechnic Institute. The authors are not professionals or experts in this subject. This project does not represent the opinions of WPI. The opinions gathered on other stakeholders only represents a small minority of a large community. As a result, the data reflected is only an interpretation of the individuals interviewed and surveyed.

Preface

We were first tasked with working with the Department of Natural and Environmental Resources (DNER) in Puerto Rico to evaluate and create a business plan to implement a recreational fishing license program. However, when Hurricane Maria hit the island, we could not feasibly carry out this task. Due to limited options, we stayed in Worcester, Massachusetts. Our revised research question was: "How does an environmental government organization structure and manage licenses fees to achieve financial sustainability?"

We shifted our project's focus towards creating a recommendations report. Since we could not go onsite to Puerto Rico to carry out our research, our two options were: to look at public and private entities near Worcester to conduct in person interviews, and to contact other agencies via email that are located beyond our maximum travel budget. With these options, we examined the structure of states' fishing license fees and determined what has or has not been effective.

For our Interactive Qualifying Project (IQP), we generated a recommendations report that can be used to build a foundation for the DNER to properly update their recreational fishing license fees since costs have not changed in twenty years. In addition, we aimed to help future IQP groups going to Puerto Rico to use the report as a reference when working on similar projects.

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TABLE OF CONTENTS

Introduction

Humanity depends on the marine environment and its resources, especially fish, for food, employment, and enjoyment. One billion people rely on fish for their main protein intake (Marine Stewardship Council, 2017). Fishing is also a major source of income, as 200 million people depend on the commercial fishing industry for financial support (Marine Stewardship Council, 2017). In addition, the ocean provides an outlet to relax by fishing for pleasure, sport, or challenge.

A study by the Food and Agriculture Organization (FAO) in 2010 revealed that as a country becomes more economically developed, recreational fishing activities exponentially increase while subsistence and professional fishing activities decrease. As a result, recreational fishing can have a direct and profound effect on freshwater and coastal fisheries in industrialized countries (Arlinghaus, Tillner, & Bork, 2015).

In recent years, the international community has faced several issues with the ocean, as they have overused resources without any thought for repercussions. Primarily, overfishing has become more prominent. The FAO estimates that 87% of all the world's fish species are depleted, fully exploited, or overexploited (FAO, 2017).

Fisheries management is the most effective method to maintain fish stocks, minimize bycatch, and reduce overfishing. Fisheries management is the action of protecting marine resources in order to achieve sustainable exploitation (Marrero, 2012). Unfortunately, fisheries management has struggled to effectively combat overfishing, creating several problems. However, one example of effective fisheries management is recreational licensing programs. These programs allow for fisheries managers to enforce safe catch limits, bycatch controls, monitoring, and ecosystem protection that is further enhanced by data collection (Beddington, J. R., & Rettig, R. B., 1984). By specifically focusing on the structure of license fees, recreational fishermen will be able to directly support fisheries management through conservation efforts. It is vital to focus on license fees since this is the primary source of profit for fisheries managers to focus on combating overfishing.

The Department of Natural and Environmental Resources (DNER) in Puerto Rico has been proactive with fisheries management through a commercial license program, marine reserve areas, catch size limits, and closed seasons (Agar, Matos-Caraballo, 2011). Now, since Puerto Rico is transitioning to a developed society, the DNER has focused their efforts on creating their

first recreational fishing license program to better manage their recreational sector. However, their license fees do not accurately reflect the island's current economic state. The government is losing a valuable source of profit that can be used to further improve existing conservation efforts.

The project's core research goal was to assess governments' recreational fishing license fee structures to create a recommendations report for the DNER to help update their license costs. Thus, we first identified what creates a successful and transparent recreational fishing license program by conducting extensive literature reviews. Next, we contacted and interviewed fishermen in order to gain their opinions on the fees of recreational fishing licenses through a quick survey. In addition, we contacted and interviewed different governmental agencies to gain insight on recreational fishing license programs. As a result, we developed a recommendations report that contain suggestions on how to restructure license fees.

Human Dependency on Fish

Over 100 million tons of fish are consumed each year globally (Kourous, G., 2005). Fish provide 2.5 billion people worldwide with over 20 percent of their average animal protein intake per capita (Kourous, G., 2005). Moreover, in developing countries, especially island populations and coastal regions, often over 50 percent of people's animal protein comes from fish (Kourous, G., 2005). Furthermore, fishing helps establish food security. People can directly increase their food supplies by obtaining their own food source.

Fishing provides employment and financial support for workers. Roughly 38 percent of all fish trade occurs on an international scale. The world's export value for fish and fish products totals to approximately 60 billion United States (US) dollars annually (Kourous, G., 2005).In addition, developing countries account for 55 percent of fishing exports. Fish industries also contribute to a large volume of employment globally. 200 million people are directly or indirectly employed by the fishing industry (Marine Stewardship Council, 2017).

Fishermen who do not fit under the category of subsistence or commercial fishermen are defined as recreational fishermen. These people are, "[fishermen] who [fish] during leisure time and [do] not sell the catch" (Pawson, Cefas, 2007). Recreational fishermen are people who do not fish for food consistently enough to be classified as subsistence fishermen.. For recreational fishermen, their catch can either be released back into the ocean or the catch can be consumed within his or her immediate social space. With a diverse population in the international community, motivations for recreational fishing vary greatly among fishermen, but the more general reasons for recreational fishing are: challenge, sport, achievement, leisure, relaxation, and aquatic social activity (Pawson, Cefas, 2007).

Overfishing

Overfishing occurs when more fish are caught than what the population can replace with through natural reproduction (FAO, 2017). The Food and Agricultural Organization (FAO) of the United Nations (UN) estimates that presently 87% of the world's fish stocks are either overexploited, fully exploited, depleted, or slowly recovering (FAO, 2017). Compared to 1960, the FAO determined that only 13% of the global fish stock were either fully exploited or overexploited. In addition, 1960 had no collapsed fish species. A collapsed fish species is defined as a "90% depletion of a species baseline abundance" (Stanford, 2006). However, fishing at these destructively high rates is not sustainable.

Recent overfishing trends have proven alarming. In the North Atlantic and North Pacific areas, there has been an 80% decline of all predatory fish species (Christensen, Coll, Piroddi, Steenbeek, Buszowski, & Daniel, 2014). On a global level, approximately two thirds of all marine predators' biomass have decreased. A majority of this decline has occurred since the 1970s, the time where fish catches were at its zenith (Tremblay-Boyer, Gascuel, Watson, Christensen, & Pauly, 2011). As a result, the International Union for Conservation of Nature Red List of Threatened Species lists that one quarter of all shark and ray species to be on the brink of extinction. Predatory fish are vital to maintaining the delicate balance in the ocean's food web. These fish ensure that prey populations are kept in check. Such a severe decline of apex predators causes catastrophic impacts in local food webs that affect entire marine ecosystems (Shiffman, 2014).

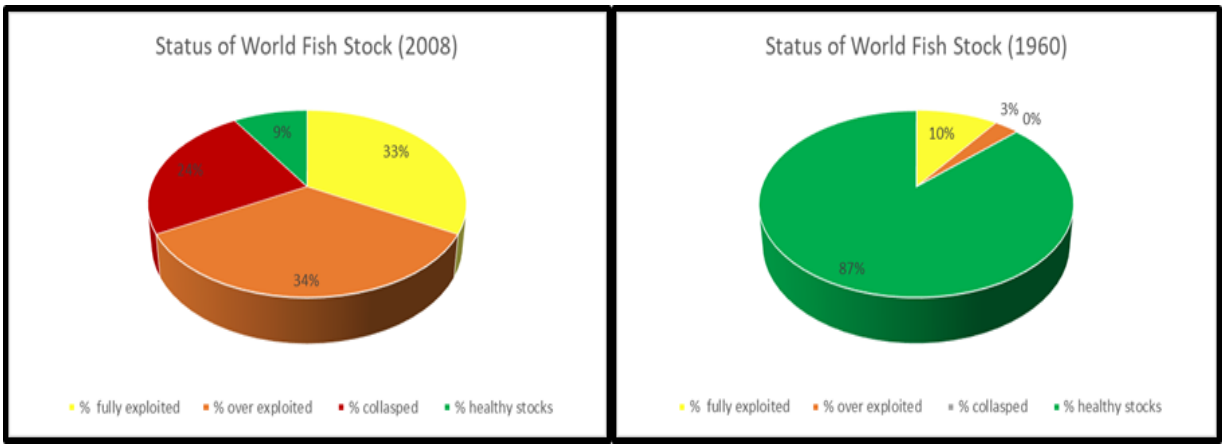


***Figure 1**: Shows overexploitation of world fish stocks (FAO) from 1960 to 2008.*

Fisheries Management

Overfishing can be attributed to human dependency resulting from a myriad of factors. The responsibility for declining stocks must be shared amongst fishermen, fisheries management authorities, scientists, and other stakeholders involved in environmental degradation. However, the primary source of overfishing is from a failure in fisheries governance (Cochrane, 2002). Not all problems lie with fisheries management, but the fisheries manager "is the person who is most often in the best position to observe and record what is happening" (Cochrane, 2002). As a result, fisheries management can often determine the cause of problem by gathering data and rectifying those within their jurisdiction by bringing those to the attention of the correct

authorities (Cochrane, 2002). However, fisheries managers often fail to act in an effective manner or simply remain unaware of the state that their resources are in, thus further worsening the situation. The erroneous decisions fishery managers make often comes down to a lack of available information, inadequate resources, or support to address the problems (Cochrane, 2002).

Fisheries management is the most effective method to maintain fish stocks, minimize bycatch, and overall reduce overfishing (Marrero, 2012). It is vaguely defined as the action of protecting marine resources to achieve sustainable exploitation (Marrero, 2012). However, there are "no clear and generally accepted definitions of fisheries management" (FAO UN, 1997). The FAO has created a working definition used by the UN to provide a summary of the responsibility taken by fisheries management (Cochrane, 2002). The definition, as set by the FAO, is:

The integrated process of information gathering, analysis, planning, consultation, decision-making, allocation of resources and formulation and implementation, with enforcement as necessary, of regulations or rules which govern fisheries activities in order to ensure the continued productivity of the resources and accomplishment of other fisheries objectives (FAO UN, 1997).

The FAO proposes its definition to be used as a standard definition when the UN is passing legislation (Cochrane, 2002). However, multiple regional fisheries management organizations (RMFOs) have their own understanding on what the definition specifically pertains to. The North East Atlantic Fisheries Commission (NEAFC) is an RMFO and their definition is, "is to ensure the long-term conservation and optimum utilization of the fishery resources in the Convention Area, providing sustainable economic, environmental and social benefits" (North-East Atlantic Fisheries Commission, 2011). In addition, the Northwest Atlantic Fisheries Organization (NAFO), an intergovernmental fisheries science and management body, and the South East Atlantic Fisheries Organization (SEAFO), define fisheries management as the responsibility to ensure the long-term conservation and sustainable use of the all living marine resources or fishery resources (Northwest Atlantic Fisheries Organization, 2010; South East Atlantic Fisheries Organization, 2017).

Comparing the definitions of the FAO and multiple RMFOs, fishery management consists of a complex and vast set of tasks that are aimed at ensuring benefits for local users with a sustainable use of aquatic resources. Successful fisheries management includes an array of

activities such as: setting policies, implementing actions to empower management authorities, ensuring that the interests of fisheries are appropriately considered with planning, reviewing management objectives regularly to ensure their effectiveness, and reporting to governments and the public on the state of the resources and management performances (FAO, 1997).

Past Actions

In the past, the international community has implemented several aggressive fisheries management strategies to combat overfishing. The United Nations Convention on the Law of the Sea (UNCLOS) was passed in 1994. Currently, 167 countries have signed and ratified the document, which states their rights and responsibilities regarding protecting the marine environment. Article 61 explicitly states that aquatic species with "proper management and conservation measures … [are] not [to] be endangered by overexploitation". It is each individual state's responsibility to ensure the conservation of their marine ecosystems. UNCLOS is legally binding, and failure to meet the standards as stated can result in punishments as determined by the International Court of Justice (UN General Assembly, 1982).

In addition, the UN has passed several resolutions regarding sustainable fisheries and their management. Resolutions 66/68, 71/123, 67/79, and 59/25 are among the many that have been passed in the last 25 years (Index to Resolutions of the General Assembly). These resolutions often focus on addressing the anthropogenic impacts on marine ecosystems and implementing necessary actions to mitigate the overexploitation of marine resources.

In 1995, the UN created the Agreement of Straddling and Highly Migratory Fish Stocks that strengthened UNCLOS, requiring that fish stocks be managed by regional organizations, thus creating RMFOs. With this agreement, RMFOs are now the primary mechanism for signatories to preserve and manage fish stocks (UN General Assembly, 1995).

In the US, there are several federal laws that are vital for fisheries management and ensuring biological and economic sustainability (NOAA Fisheries 2017). In 1972, Congress passed the Marine Mammal Protection Act (MMPA) in response to rapidly declining populations of marine mammals due to anthropogenic activities. Populations dwindled to a point where they could no longer be healthy, contributing members to the fundamental ecosystems in which they inhabit (NOAA Fisheries 2017). The MMPA established the first national policy to require an ecosystem-based approach for marine resource management. To protect and conserve marine mammals, the MMPA strictly forbids the hunting, capturing or killing of any species within its

guidelines. In addition, exporting or importing these mammals or their parts and related products are explicitly forbidden (NOAA Fisheries 2017). The National Oceanic and Atmospheric Administration (NOAA) Fisheries, US Fish and Wildlife Services (USFWS), and the Marine Mammal Commission are all federal agencies that are partially responsible for implementing the MMPA. These groups oversee the protection of marine mammals such as whales, dolphins, sea otters, and polar bears, and they provide a scientific perspective of governmental policies and actions that focus on anthropogenic impacts on the marine environment (NOAA Fisheries 2017).

In 1973, the Endangered Species Act (ESA) was passed because, without immediate action and long-term protection, several US plant and animal species would have become extinct. The federal government is responsible to protect species that are in danger of extinction (endangered), species likely to become endangered in the future (threatened), and critical habitats. The ESA primarily protects and recovers these threatened species and their habitats or ecosystems that they depend on. Data is collected and analyzed towards species recovery to determine the status of a species as threatened or endangered (NOAA Fisheries 2017). NOAA Fisheries and the USFWS are primarily responsible for implementing the ESA. Since 1973, there have been several successful turnarounds with preventing species extinction, further proving the need for the ESA. The Eastern Steller sea lion, Coho salmon, Gulf sturgeon, Hawaiian monk seal, shortnose sturgeon, and white abalone are among the few species that have come back from brink of extinction (NOAA Fisheries 2017).

The Magnuson-Stevens Act (MSA) was passed in 1976. It is the primary law that oversees fisheries management within all federal waters. The main objectives of the MSA are to prevent overfishing, rebuild depleted fish stocks, increase long term economic and social benefits, and ensure a sustainable food supply (NOAA Fisheries 2017). In addition, the MSA extended where international waters began from 12 miles to 230 miles from shore to better regulate foreign ships. Eight regional fishery management councils were also established to develop local plans that comply with MSA standards.

To reflect the changing environment, Congress has released two extensive revisions, in 1996 and 2007, to more aggressively combat overfishing (NOAA Fisheries 2017). Congress's latest revision in 2007 instructed the NOAA to develop the National Saltwater Registry. In December 23, 2008, the NOAA Fisheries Service released its final rule to establish a national saltwater angler registry to identify all marine recreational fishermen (NOAA, 2008). This rule

requires recreational fishermen in national ocean waters to be included in the national saltwater angler registry by January 1, 2010. Anglers not already registered by an exempted state and wish to fish in federal waters are required to register with NOAA. This also includes areas not part of the contiguous US, as in those "fishing on a private boat in Hawaii, Puerto Rico, or the US Virgin Islands," unless the angler already has a saltwater license issued by any of the coastal states (NOAA, 2010). Coastal states that did not have recreational fishing license programs before the beginning of 2010 were required to either create a satisfactory program, allowing the state to keep license fees for themselves or else require anglers to register themselves and forfeit any potential revenue towards the federal government. Since 2011, anglers who wish to fish in national waters but do not have a saltwater fishing license are charged an estimated fee of $15 to $25 per angler (NOAA, 2008). NOAA uses the collected information, such as an angler's name, date of birth, address, telephone number, and the regions where they intend to fish, to conduct surveys on fishing efforts and catch numbers.

Fisheries Management Issues

Unfortunately, fisheries management has struggled to effectively combat overfishing, creating several problems with insufficient management. The present situation is rooted in social, political, and economic issues that contribute to worsening environmental conditions. The environmental consequences are already occurring with ineffective fisheries management. By catching too many mature, fertile adults and young, growing aquatic organisms at once, the marine ecosystem and its surrounding environment are drastically impacted (Nomura, 2008).

Social equity issues need to be thoroughly considered with fisheries management. Fishing is a source for economic growth for many developing and developed countries that, in turn, boosts national economic development (Nomura, 2008). In developing countries, destitute people often do not have the necessary resources to practice sustainable fishing. Meanwhile, developed countries comprised of a plethora of small scale based fisheries lead to several different, inaccurate perceptions of fisheries management (Nomura, 2008). Consequently, social aspects of fishery management are now an important facet that needs to be addressed based on the principles of integrated resource management. There are two main points that are cause for action: the inevitable complications will arise amongst the public with limited access to fisheries that are currently becoming biologically and commercially sustainable, and the people's reactions to strong management strategies when their livelihoods are at risk to radically change

(Nomura, 2008). Limiting access can be detrimental to people who depend on fisheries for a livelihood and can magnify their reactions (Nomura, 2008).

Ineffective governmental actions can be directly seen in failures of fisheries management in attempt to achieve their social, economic, and environmental objectives. A lack of strong governmental action stems from a lack of sufficient will, ability, or a combination of both (Nomura, 2008). This inadequate state is rooted in several, smaller issues. Governments receive data with high levels of uncertainty, leading to poor management decisions. There is an inherent conflict between focusing legislation on short term economic and social goals and focusing legislation on long term biologically and economically sustainable objectives. Unfortunately, a higher priority is placed on short term goals that further perpetuate overfishing through inadequate management. Unclear definitions with common vocabulary among stakeholders lead to miscommunication and rash decisions compared to proactive steps. Legal frameworks often have several shortcomings including: fishing rights, implementation, and insufficient participation among all stakeholders (Nomura, 2008). Furthermore, there is an irresponsible management of financial, human, and physical resources in agencies (Nomura, 2008). Within these agencies, there is inadequate monitoring, surveillance, control, and penalty actions.

Economic issues and topics surrounding fisheries management remain complicated, and it is paramount to completely understand the economic scope that encompasses the entire fisheries sector. First, optimum market conditions usually ensure economic efficiency, but that does not necessarily apply to the fishing industry (FAO, 1996). It is vital to address the impact that pricing and other externalities have that can eventually lead to over-investment, economic waste, and economic overfishing (FAO, 1996). Additionally, economic overfishing occurs where more fish are harvested than necessary to ensure maximum profit. Furthermore, profits from fisheries are influenced by a broader, external economy. If macroeconomic factors are not effectively integrated into fisheries management programs, externalities can potentially disrupt any positive actions taken to mitigate overfishing (FAO, 1996). Fishery management failures and poor economic performances are both linked to the complexity of fisheries with by-catch, discards, scientific uncertainty, and conflicting objectives. These issues are often compounded by an inability to support the associated costs for fisheries management (FAO, 1996).

Recreational Fishing Management

A study by the FAO in 2010 reveals that as a country becomes more economically developed, recreational fishing activities exponentially increase while subsistence and professional fishing activities decrease. As a result, recreational fishing has become the dominating force in a majority of freshwater and coastal fisheries in industrialized countries (Arlinghaus, Tillner, & Bork, 2015). However, the recreational fishing sector is not heavily regulated unlike commercial fishing. As a result, the data from these activities is often inaccurate and uncertain. For example, a global estimation of the recreational fishermen population varies widely with data ranging from 220 million to 700 million participants (World Bank, 2012; Cooke & Cox, 2004).

One example of fisheries management is recreational fishing license programs. These programs allow for fisheries managers to enforce safe catch limits, bycatch controls, monitoring, and ecosystem protection through data collection (Beddington, J. R., & Rettig, R. B., 1984). Recreational fishing ranges from fishing for challenge, sport, achievement, leisure, relaxation, and aquatic social activity (Pawson, Cefas, 2007). However, recreational fishing is not to be used as a source of profit.

Additional data gathering, and effective planning is needed for recreational license programs to become a strong driver against overfishing. By understanding the reasoning behind why people fish recreationally, better data regarding predictors and trends can then improve economic aspects of recreational fishing such as marketing and recruiting initiatives (Arlinghaus et al., 2015). Moreover, by accurately predicting the number of recreational fishermen, developments and investments in the tourism industry will increase and improve the design of fisheries policies due an availability of monetary resources (Kearney, 1999). In addition, broader fisheries management issues are translated to the recreational fishing sector. Recreational fisheries in the modern era has become a political issue since fisheries management decisions are created by politicians and the government (Kearney, 1999). Often, slow government processes translate into a slow process for implementing and creating recreational fishing legislations. Socially, it is often difficult to get fishermen, third party organizations, and governmental organizations all to agree on fishery management measures.

The social and economic benefits from recreational fishing include an increased quality of life for fishermen and more income generated at local, regional, and national levels for fishing

expenditure-dependent activities such as bait shops. In North America, recreational fishermen directly support fisheries management, conservation efforts and outdoor recreational activities through taxes and the purchasing of licenses, stamps, and fees.

United States

On average, 10.52% of the total population in industrialized countries fish recreationally (Arlinghaus et al., 2015). In the US alone, as many as 33 million people, over 10% of the total population, aged 16 or older participate in the activity. Fishing in the US is an economic force since it is the foundation of an industry that supports more than 828,000 jobs (United States Department of the Interior, Fish and Wildlife Service, 2013). According to the American Sportfishing Association, fishing is one of America's most enduring pastimes. It is an activity where family members are able to spend time together in an outdoor environment (Allen, Southwick, & Howlett, 2013).

Many fisheries management agencies depend on revenue from fishing licenses to maintain their programs (Hunt et al., 2017). In the US recreational fishing license programs generate an annual total revenue of $708 million from the sale of licenses and permits (United States Department of the Interior. Fish and Wildlife Service, 2017). Furthermore, recreational fishermen approximately spend $48 billion annually on equipment, licenses, trips, and other fishing-related items or events (United States Department of the Interior. Fish and Wildlife Service, 2013). The revenue is used in myriad ways depending on the state. However, all the funds must be used by governmental agencies to regulate and manage fishing activities (Allen, Southwick, & Howlett, 2013).

One way of utilizing the revenue from fishing licenses is to enhance fishermen's experience by improving fishing and boating access and increasing fish stock. The state's natural resources agencies stocks ponds, lakes, streams, and rivers that are low in fish to maintain a rich environment (Keer, 2015). For example, in Massachusetts, the Division of Fisheries and Wildlife is responsible for stocking fish. In 2017, approximately 600,000 trout will be stocked all over the state, and fishermen are encouraged to take advantage of the stocked fish (Mass Wildlife, 2017). Funds are also used for education, research, and surveying programs. These programs are essential for fishermen, as it keeps track of fish habitat's health and minimizes any potential damages that could occur. The educational programs across the country help improve the skills of any new fisherman (Keer, 2015). In addition, the Massachusetts Division of Fisheries and

Wildlife offers an Angler Education Program to help "beginners dive into the world of freshwater fishing" (Mass Wildlife, 2017).

Funds are used for habitat rehabilitation programs by removing trash or debris that heavily pollutes any aquatic environment. For example, in Florida, lost or abandoned traps for the spiny lobster, stone crab, and blue crab create a problem to other various aquatic organisms. Therefore, the Florida Fish and Wildlife Conservation Commission organizes volunteer groups to help remove the derelict, discarded traps and other debris from state waters (Florida Fish and Wildlife Conservation Commission, 2017).

In conclusion, the five major ways the US allocates their revenue from the sale of licenses and permits are: improving boat and fishing access, maintaining fish stocks, hosting educational programs, funding surveying programs, and organizing debris cleanup. These different methods of distributing funds are an example of the different ways on how to allocate and budget license revenue.

For the state of California, the license prices have adjusted each year to account for inflation. For example, the cost of an annual resident sport fishing license has increased from $39.50 to $43.50 from 2010 to 2017, and the annual non-resident license has increased from $106.50 to $117.00 in the same amount of time (California Department of Fish and Wildlife, 2017). While updating these fees may keep California up to date, however, California has experienced a drop in recreational fishing license sales (California Sportfishing League, 2015). Annual fishing licenses sold has decreased from 2.26 million in 1980 to 990,000 in 2014 (California Sportfishing League, 2015). Although due to high costs, recreational fishing in California has plummeted.

Alternatively, to promote participation in recreational fishing, Maine has established legislation to replace its fee-based saltwater recreational fishing license (Blinkoff, 2011). For those already in possession of a freshwater fishing license, either as a resident of Maine or elsewhere in the US, anglers are exempted from registering in Maine with an additional license. The only fee that remains is a minimal $1 to $2 agent fee (Blinkoff, 2011). This removal of the license fees and the adoption of an operator's permit, a free license for private dock owners and boat operators to allow anglers to fish on their property, "'can advertise that Maine saltwater fishing is virtually free through the registry'" (Blinkoff, 2011). This increases the opportunities

for anglers to engage in the environment without the barriers of regulations and excess license processes.

Additionally, several states such as Florida have implemented multiple weekends throughout the year as license-free fishing days for both residential and non-residential anglers. These free fishing days encompass the first weekend of April and the second weekend of June for license-free freshwater days, as well as the first weekend of June, the first Saturday of September, and the Saturday following Thanksgiving for license-free saltwater fishing days (Florida Fish and Wildlife Conservation Commission, 2017). These free fishing days serve as an opportunity for parents or experienced anglers to introduce friends and children to fishing without the purchase of a license meaning that "the fishing license requirement is waived for all recreational anglers" (Florida Fish and Wildlife Conservation Commission, 2017).

Puerto Rican Fisheries

Overfishing has the capacity to cause a steep decline in Caribbean fisheries, between 35% and 40%, due to a high demand of sport fishing in the tourism industry (CARSEA, 2007). Puerto Rico is part of the Caribbean Large Marine Ecosystem (CLME) (CARSEA, 2007). The CLME is the second largest sea in the world by covering an approximate 4 million square kilometers (CARSEA, 2007). The string of Caribbean islands, including Puerto Rico, has been classified as a biodiversity hotspot (Durrell Conservation, 2016). To be identified as a hotspot, an area must contain at least 1,500 endemics, local only to that specific region, species and must have lost at least 70% of its original habitat (Critical Ecosystem Partnership Fund, 2016). This particular Caribbean hotspot supports approximately 2% of the world's total species, making it an important ecosystem to conserve (Durrell Conservation, 2016).

In addition, there needs to be a higher priority for conservation of the diverse Caribbean marine ecosystem as the situation is becoming more severe. Within Puerto Rico, it is estimated that fish stocks have been overfished since the 1980s (Matos – Caraballo, 2008). In 2016, the NOAA added three indigenous species to its overfished list: Triggerfishes and Filefishes Complex, Caribbean spiny lobster, and the Wrasses Complex (NOAA, 2016). Currently, these fish stocks have a harvest rate higher than the rate that produces its maximum sustainable yield. Furthermore, a study conducted in 2008 discovered that 46% of surveyed fishermen reported worsening fishing conditions. In addition, half of these surveyed fishermen strongly believe that

these conditions are due to a combination of overfishing, pollution, and habitat destruction (Matos - Caraballo, 2008).

Overall, overfishing has the potential to cause severe stress and the collapse of all marine ecosystems. From an anthropogenic aspect, one examining human activity, society is facing a plausible loss of valuable food sources that consumers and fishermen depend on for dietary, social, and economic reasons.

Fisheries Management

Past Actions

Puerto Rico has implemented a wide range of fisheries management actions dedicated towards combating overfishing. Primarily, there are marine reserve areas (MRAs) which are a subdivision of marine protected areas (MPAs) (National Geographic, 2011). MPAs are sections of the ocean where local governments have placed limitations on human interaction and activity with that area (National Geographic, 2011). An MRA designates that a specific area has no fishing for an extended amount of time until further noted (Pacific Fishery Management Council, 2013). Limiting human activities allows MRAs to slowly improve the marine environment and its resources by allowing biodiversity to redevelop and rebuild stock resources. (Pacific Fishery Management Council, 2013). The DNER has established marine reserve areas all over the island. As of 2016, the DNER estimated that approximately 26.7% of continental shelf waters were designated as MRAs. Furthermore, previously passed laws and regulations have established measures to control overfishing. Puerto Rico's Fishing Regulation 6768 created open and closed seasons as well as a minimum legal size for catch limits of fish species (Agar, Matos-Caraballo, 2011). For example, the silk snapper has a minimum catch size of 16 inches, giving the species time to mature and reproduce before being caught (Agar, Matos-Caraballo, 2011). The blackfin snapper now has a closed season in place from October to December each year since 2007 (Agar, Matos-Caraballo, 2011).

Fisheries Management Issues

When managing fisheries in Puerto Rico, there are a few core underlying issues. Issues with commercial licenses certainly translate to the recreational sector that need to be addressed. However, there is a vital piece of infrastructure missing. Puerto Rico lacks a recreational fishing

license program that translates to political, economic, and social issues that are highly pertinent to address in order to effectively manage Puerto Rican fisheries as a whole.

Discourse among the local politicians causes them to hesitate with approving a recreational fishing license program. Currently, there are potential unknown consequences, doubts, and lobbying struggles that have halted the program's implementation (C. Lilyestrom, personal correspondence, September 19, 2017).

Without a recreational fishing license program, the Puerto Rican government is losing a valuable source of revenue. Fishing in the Caribbean provides valuable ecosystem services and annually yields 1.2-billion-dollars in profit with export earnings (CARSEA, 2007). In 2012, there were an estimated 93,840 recreational fishers where 83,837 were island residents and 10,003 were non-island residents (Lilyestrom, C., Garcia, M., Rodriguez, G. & Rodriguez, Y, 2013). Although Puerto Rico has established the basic legislations needed to implement a recreational fishing license program, license fees have not been updated in 20 years. With such a large gap between recreational and commercial fishermen, the potential for profit appears promising that comes with updating license fees.

However, one of the more prominent issues surrounding the implementation the system stems from the local community. A survey conducted by the Gulf and Caribbean Fisheries Institute in 2007 discovered that out of 868 interviewed local, commercial fishermen, only 66% had fishing licenses (Agar, Matos – Caraballo, 2011). Many local fishermen are often reluctant to purchase licenses because of how the tax system is structured. Even when licenses are purchased, fishermen complain of how slow the process is. Often, they claim that they do not have communication for 3 to 6 months with the DNER. Law 278 and the fishing regulation 6768 requires that every licensed commercial fisherman submit their taxes to the Hacienda Department, Puerto Rico's Internal Revenue Service, every year (Agar, Matos – Caraballo, 2011). However, by reporting their profits fishermen relinquish their ability to receive welfare or other social services and place themselves in a higher tax bracket. Part time fishermen are required to pay an additional tax based on their fishing income to compound the situation even more. The Puerto Rico Department of Agriculture states that declared full time fishermen will have a tax deduction of 90% based on their income (Agar, Matos – Caraballo, 2011). But a majority of commercial fishermen still do not purchase licenses since they deem themselves too

destitute to contribute to the local government. Local fishermen have also expressed frustration with regulation measures that the DNER has implemented and refuse to buy fishing licenses.

Recreational Fishing

As Puerto Rico transitions towards an industrialized society, there will be an increase in recreational fishing and a decrease in commercial fishing. Even now, tourism and recreation account for 87% of the ocean economy in Puerto Rico and that one of the most popular local recreational activities is recreational fishing (Clements et al., 2016). In addition, a study determined there are roughly 100,000 recreational fishermen in Puerto Rico, who spend $72 million annually on recreational fishing (Clements et al., 2016).

In 1997, the government passed Law 115, Ley de Incentivos de la Pesca Deportiva y Recreativa, that incentivized the development of sport and recreational fishing (Ley de Incentivos de la Pesca Deportiva y Recreativa, 1997). Law 278, Ley de Pesquería de Puerto Rico, was passed to redefine the concepts of fishing. This law and Law 115 gives the DNER administrative power over recreational licenses where they can enforce any legal aspects (Ley de Incentivos de la Pesca Deportiva y Recreativa, 1997; Ley de Pesquerías de Puerto Rico, 1998).

In 2010, the DNER published regulations about fishing in Puerto Rico's jurisdictional waters. The regulation was published in "Reglamento de Pesca en Puerto Rico- 2010, num. 7949", where all the laws and policies about fishing licenses are stated. Although the requirements for a recreational fishing licenses exist, the license system has not been implemented.

In March of 2017, a new law, Ley de Pesca del Estado Libre Asociado de Puerto Rico, stressed the importance to temper public policy and facilitate the implementation of legislation (Montañez, Rodríguez, Dalmau, & Angleró, 2017). In the proposal, Article 7 states that anyone who fishes on the island must possess the necessary licenses and permits, including recreational fishermen (Montañez, Rodríguez, Dalmau, & Angleró, 2017). This law proposal was introduced as a legal aid to the existing fishing regulations in Puerto Rico and allows the DNER to administrate and manage fisheries in their jurisdictional waters.

License Fee Structure

The following description of the regulatory requirements was gathered from Reglamento de Pesca en Puerto Rico -2010. The Puerto Rican government has divided the recreational fishing license into two types: licenses to fish in interior, inland waters and the licenses to fish in

the open ocean. The two types of licenses have the same requirements (Muñoz, 2010). However, it is important to note that these license prices have not been updated in past 20 years and do not reflect fluctuations with inflation and other externalities that can impact prices. To purchase a recreational license, the following requirements must be met:

A. Be 13 years of age or older.

B. Complete the forms provided by the DNER.

C. Share information about fishing activities when requested.

D. Pay the following amount given by the Table #1.

Type of License	1 day	1 week	1 year
13 to 14 years resident	$0.00	$0.00	$0.00
15 to 21years resident	$3.00	$5.00	$5.00
22 to 60 years resident	$3.00	$5.00	$20.00
Older than 60 years resident	$0.00	$0.00	$0.00
US citizen, non- resident	$5.00	$7.00	$35.00
Visiting foreign citizen	$7.00	$10.00	$50.00

***Table #1**, the show the cost of the license according to the age and the length of the license, in 1997.*

E. The duplication of the license will have a $3.00 cost and will be an exact copy of the original, including all the permits associated with it.

F. The costs established in this Article shall be paid at the time of filing the application and will not be refundable in the event of a denial of the license.

Summary

Fisheries management is a complex system, but, when used efficiently, can combat overfishing. By improving recreational fishing programs, fisheries managers can better monitor and control their jurisdiction of waters. However, it is of utmost importance to take into account social and political facets of fisheries management since their effects can aggravate overfishing.

Puerto Rico has not updated their license fees since 1997. Having current license fees is vital towards a successful recreational fishing license program. The current fees allow the department ovexrseeing the program to maximize their profits and allocate their profits as they see fit. The revenue goes towards improving the fishery as a whole from providing better boat access to the water to collecting data and operating hatcheries.

Even though Puerto Rico has established laws and regulations for recreational fishing licenses, there is still no implemented system that is strictly enforced by the government. The gap between such an idea on paper to be a fully-fledged program is due to outdated infrastructure. Puerto Rico needs an updated program so that fisheries and overfishing can be properly managed.

However, Puerto Rico is still focusing their efforts towards rebuilding after Hurricane Maria. It is of extreme importance that the team's final recommendations report considers and respects Puerto Rico's current state. The group understands that it is possible that it will take time for recommendations to be adopted.

Methodology

The project's core research goal was to assess recreational fishing license programs to create a recommendations report for any agencies that will update their license fees. Our research question was: How does an environmental government agency structure and manage recreational fishing license fees to achieve financial stability? To understand how, we developed these research objectives:

1. Identify what makes a successful and transparent recreational fishing license program.
2. Contact and interview fishermen in order to gain their opinions on the fees of recreational fishing licenses.
3. Contact and interview different organizations and agencies to gain insight on recreational fishing license programs.
4. Develop a recommendations report that contain suggestions regarding how an agency can structure and manage their license fees in order to best advance the fishery and achieve financial success

To help achieve these goals, we employed a number of different research methods. Overall, this methodology section explains the methods, reasoning, and processes behind the work that we conducted.

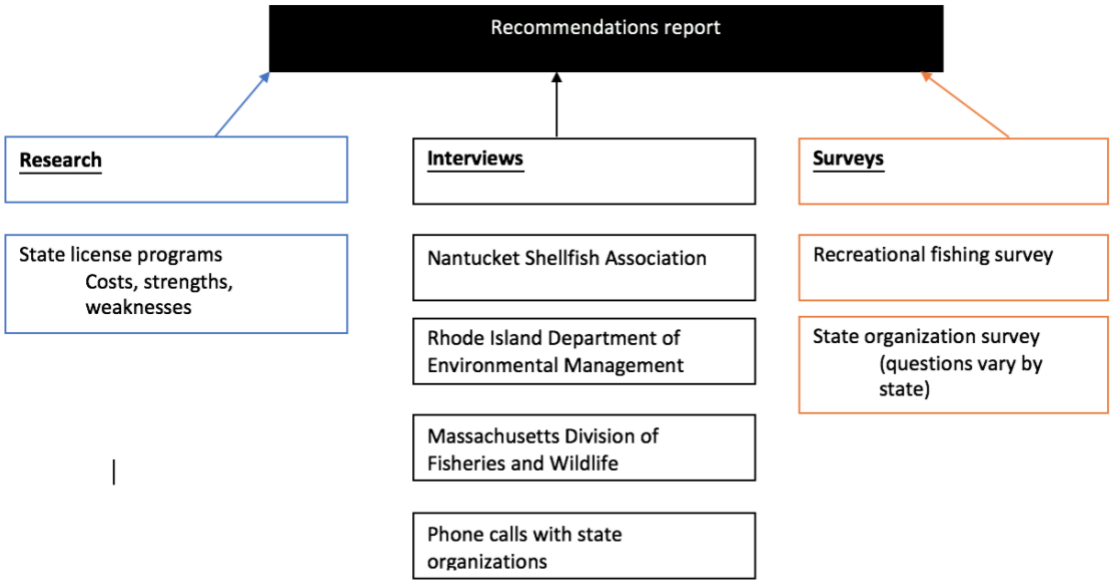


Figure 2. *Visual representation of our methods.*

Research: Identify the current strengths of US recreational fishing programs

We planned to address our research question through research on current US recreational fishing license programs. Our research focused on how current license programs allocate generated revenue from the sale of fishing permits and licenses. Identifying these factors allowed us to determine if the execution of a recreational fishing license program is successful in the long term. We focused on addressing the program's financial needs and distribution of funds.
We divided our primary research question into the following topics:

- What are the current license prices in each state?
- What are the factors that determine different prices based on the customer?
- What are the benefits of different lengths of time for fishing license expiration?
- How does the revenue from fishing license sales get distributed?

To create an effective recreational fishing license program, it is important to know what has worked in the past for other, similar programs. Since the local and state governments create and establish recreational fishing license programs, we researched US recreational fishing license programs and specifically focused on their license fee structures.

To acquire the additional information on financial strategies, we conducted research on how profits from license fees were allocated and distributed. Researching into other state governments' profit distribution strategies enabled us to construct recommendations that can apply to broader types of agencies.

We held key informant interviews with members of several US states' respective natural resources departments to supplement additional information that we could not acquire through research. We used the previous research questions to draft our formal interviews. We held these key informant interviews to best receive information to create recommendations (USAID, 1996). It was not a random sample, and therefore not a full representation of every state's average citizen, but our choice of individuals for interviewing provided relevant, expert opinions specifically for our research questions (Marshall, 1996). As a key informant interview, our data collected from experts provided insights from a perspective that a literature review could not cover (Marshall, 1996). Our questions were tailored to our informants' backgrounds. The interviewees belonged to states' equivalent departments of environmental resources about financial and political responsibilities associated to our primary questions. We formed a formal interview structure and questions specific to the interviewees' responsibilities and knowledge.

However, we acknowledge that these interviews may perpetuate certain biases or subjective opinions. We attempted to mitigate bias through careful selection of the key informants and through avoiding any ambiguity during the interview process with questions, opinions, or any issues.

Notes and data were recorded from the interviews, and we archived the data in a Microsoft Word file. After reviewing each interview, we generated a separate Microsoft Excel page with the report of the financial perspective associated with the creation of the program. To analyze the interviews' qualitative data, we generated codes based on the most frequently used phrases within each interview.

Survey: Understand fishermen's opinions on the fees of recreational fishing licenses

We reached out to fishermen to gain their personal opinion on the pricing of the recreational fishing licenses in their respective state or states that they primarily fish in. We created a short survey that contained questions, grouped in three core sections, that gave us fishermen's general opinions on licensing fees. Conducting a survey was the best option to gather fishermen's opinions on recreational fishing licenses. It kept the group's personal opinions and bias to a minimum and we were able to gather a large, varied amount of sample data from our respondents. Since each respondent had access to the same questions and was able to view their results after taking the survey, our data gathered can be reliably compared and used for our recommendations (Bernard, 1994). The core sections we addressed in our survey were:

General Fishing Information Section

The beginning section of the survey provided us with a background of the fishermen who took the survey. The information gained from these questions helped us gain a general idea on how often people fished as well as how much they spend on fishing. From this section, we were able to obtain a rough estimate of how much money recreational fishermen typically spend, excluding their fishing license fees. We used this data to analyze trends based on different fishermen demographics and related them to other sections of the survey.

Purchasing a Recreational Fishing License Section

This section of the survey investigated opinions on the process of obtaining a recreational fishing licenses and the reasons behind why or why not a person would purchase one. With this set of questions, we determined the recreational fishermen's approaches to buying a fishing

license. More importantly, we found a recreational fishermen's perspective on why or why not someone would purchase a recreational license. Following the General Fishing Information questions, we discovered trends that related to these sections. From there, we shifted to how recreational fees were utilized.

Knowledge and Opinions Behind Recreational License Fees Section

From the last two core sections, we gained the general information of recreational fishermen as well as their purchasing views on recreational fishing licenses. This last section asked about the fishermen's personal view of their recreational fishing license from a pricing standpoint. From this section, we discovered data regarding recreational fishermen's general opinions of their license prices and their awareness of where the license fees go. This information was vital towards our overall objective on how the pricing of recreational fishing licenses are determined. Throughout the whole survey, we found trends about recreational fishermen's demographics and how they willing they were to pay for their licenses. We have also determined the general opinions of these fishermen and their views on where they would like their fees to go towards.

We created our survey using the software tools provided by Qualtrics. Qualtrics is a privately held experience management company founded in 2002 (Chapman, 2012). Qualtrics was extremely helpful for our project because their software enabled users to collect and analyze data online for different purposes (Martin, 2012). We sent emails with a link to our survey to recreational fishermen affiliated with angler, bass, and fly-fishing associations. From there, when the survey period was over, Qualtrics analyzed the data from our survey and formed a report with graphs of the responses to each question.

Interview: Contact different organizations and agencies to understand recreational fishing license programs

We sought to identify what US regional governmental agencies have done to cover issues unresolved by current actions. Thus, we held key informant interviews with members of environmental agencies in New England states to see what they have done to help recreational fishing license programs. Our two main interviews were in person with the Rhode Island Department of Environmental Management and the Massachusetts Division of Fisheries and

Wildlife. In addition, we had email interviews with the related state departments of Arkansas, California, Florida, Michigan, New Mexico, New York, and Tennessee.

The core research questions we addressed during our main interviews are:

1. How do you determine the price of recreational fishing licenses?
2. What tangible environmental impacts have come as a result of the fund distribution to fishing fish stock monitoring?
3. Do you let the public know of where the recreational fishing license fees go towards? If so, why do you do so?
4. What are some challenges with managing a recreational fishing license program?

We asked questions in four main topics: pricing process, environmental benefits with the distribution of license revenue, agency transparency and its relation to the public, and license program challenges. Question 1 focused on the pricing process. We asked this question to determine what factors are included when creating or updating license fees. It was vital for our research to understand what influences these prices to remain informed on these different factors so we could deliver our final method to our original sponsor. Question 2 focused on any environmental benefits that can arise from the licensing program. We wanted to know about the positive environmental benefits that arise from a recreational fishing license program that combat overfishing. For countries that are becoming more industrialized, recreational fishing becomes more commonplace and begins to have a larger negative impact on the marine environment. Question 3 focused on the relationship between agencies and the public along with the agency's transparency with the public. We wanted to gather information about the agency's relationship with the public to determine how important transparency is between the two stakeholders. Knowing the relationship between the two parties allowed us to better understand and rationalize the public's reactions towards whatever actions the agency might implement. Question 4 focused on any challenges the program faces in both a short and long-term situation. Understanding the challenges associated with such a program was important to see what issues could have arisen that could be related to license fees in any way.

To acquire the information, we held key informant interviews with members from different governmental agencies. We used the previous research questions, as well as the ones from the previous objective, to draft our formal interview. We held these key informant interviews to best receive information to create recommendations (USAID, 1996). While key

informants are not a random sample and not an accurate representation of all NPOs or individuals within the state population as a whole, our choice of individuals for interviewing provided relevant, expert opinions specifically for our research questions (Marshall, 1996). As a key informant interview, our data collected from experts provided insights and opinions from a perspective that a literature review could not cover (Marshall, 1996). Notes and data were recorded from the interviews and we archived the data in a Microsoft Word file. After reviewing each interview, we generated a Microsoft Excel file with the report determining the most effective strategies, as determined through qualitative analysis of coded interview phrases, associated with the shortcomings of recreational fishing license programs.

Develop a recommendations report that contain suggestions on how to restructure license fees.

Once we transcribed, archived, and analyzed all the information from the interviews and surveys, we then created the recommendation report. A typical recommendation report begins with, "a stated need, a selection of choices, or both and then recommends one, some, or none [of the choices]" (McMurrey, 1997). We chose to create a recommendation report to summarize our findings, as it not only created suggestions for structuring license fees, but also it provided the data and conclusions that led to our decisions (McMurrey, 1997). Anyone will be able to read our findings and logic and to draw their own conclusions that best suits their unique situation.

For our recommendations report, we outlined the basic mechanics of each fishing license program on a state by state basis. Next, we compared these programs through different requirements based on the licenses-- for example, saltwater and freshwater licenses. Afterwards, we summarized our comparisons in a table to visualize our data. Our conclusions started with the best of each requirement category, and then showed how these programs rank against each other's benefits and drawbacks. Finally, we gave our recommendation for the best choice, and offered a suggestion on how to synthesize the benefits of each program and the efforts of NPOs. We created a PDF copy of our report and shared it as a resource for agencies seeking to improve or create a recreational fishing license program.

Findings

Through surveys, interviews, and research, our project team identified the necessary procedure to update license prices and the challenges faced by an agency surrounded by structuring the license fees.

We divided this chapter into three parts based on our research question. Each finding correlates to one of three sections: structure of license fees; managing the generated license revenue; and determining the allocation of generated profits from license sales.

Finding: Recreational fishermen are willing to financially support fisheries management through the purchase of a recreational fishing license.

Summary of Evidence. The recreational fishermen surveyed across the US and the interview with the Rhode Island Department of Environmental Management revealed the following information:

- 93% of recreational fishermen surveyed are willing to pay for a recreational fishing license.
- 77% of the recreational fishermen surveyed are willing to pay more money for their recreational fishing license if they know that the money spent is going to improve the local fisheries.
- 85% of the fishermen surveyed purchase their license because they "like to support proper fisheries management" and think that the current price that they pay for their recreational fishing license is reasonable.
- Recreational fishermen in the US have previously confronted their government representatives to implement a recreational fishing license program.

Explanation. Recreational fishermen across the US purchase their recreational fishing licenses to financially support fisheries management. The sale of recreational fishing licenses acts as a source of revenue for the agencies responsible for fisheries management. In the survey, when the recreational fishermen chose the value, in dollars, that they are willing to pay for their fishing license, that amount also represents the amount of financial support they are willing to give fisheries management agencies. Upon purchase, these license fees are often given back directly

to the agencies responsible for where the fishermen fish in their general jurisdiction. From our survey, we identified that a majority of the fishermen are willing to pay for their recreational fishing license. 100% of the fishermen surveyed felt legally compelled to obtain a fishing license and therefore purchased their recreational fishing license in the state in which they fish. In addition, 93% of the total recreational fishermen surveyed are willing to pay for a recreational fishing license which indicates that there is a general satisfaction with the current license prices. The average price that fishermen are willing to pay for the license in our survey is $39 compared to average price for most state fishing licenses is much lower than that. The amount that fishermen are willing to pay varies in the range from $0, where they do not want to give financial support, to $100, our survey's maximum. Figure 3 below shows the range and distribution of the financial willingness of the recreational fishermen to purchase a recreational fishing license as well as the question as it appears in the survey.

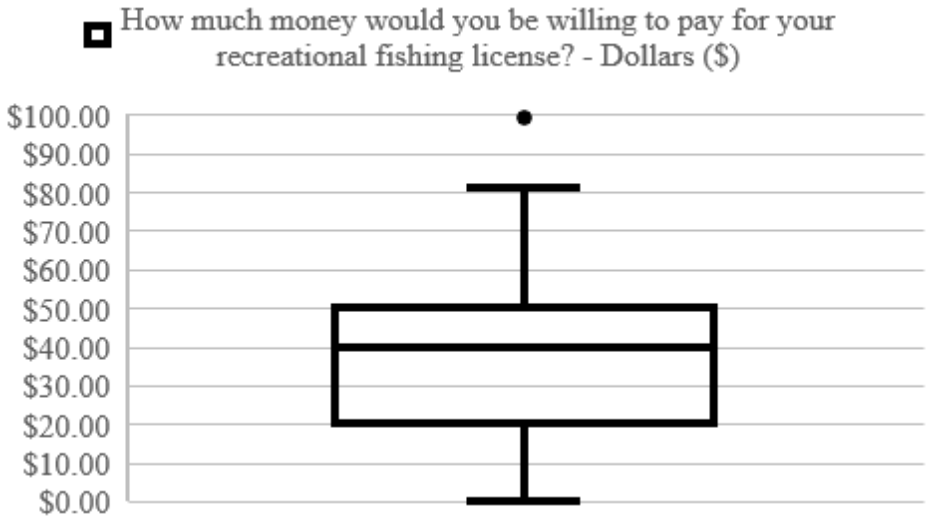


Figure 3, *Represents the dollar amount recreational fishermen are willing to pay for a recreational fishing license.*

From the survey, it is clear that people are willing to spend additional money on fisheries management if they know that their money is put to relevant use. From all the fishermen surveyed, 28% do not know for what recreational fishing license fees are used. However, even those fishermen who do know how their fees are allocated can be persuaded to spend more money on their license. The survey shows that 77% of all the fishermen are willing to spend more money on their recreational fishing license if they know that the money is going to be used to directly improve the fisheries. These fishermen are willing to spend, on average, an additional

$21.00 on top of their original license cost. Figure 4 below shows the range and distribution of recreational fishermen's willingness to spend extra money on a recreational fishing license, as well as the question as it appears in the survey.

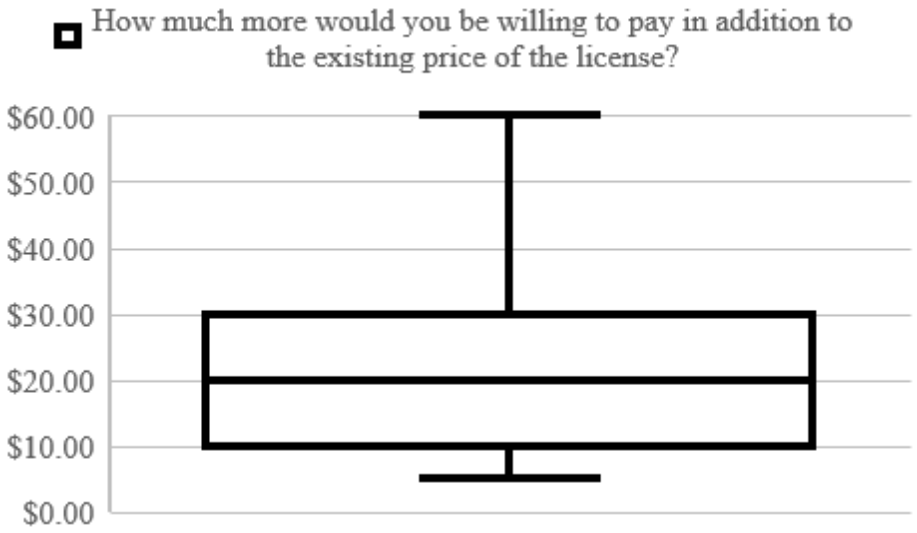


Figure 4, *Represents the dollar amount recreational fishermen are willing to pay in addition to their current recreational fishing license cost.*

The motivation for fishermen to purchase their license is crucial in understanding their involvement in supporting fisheries. As one of the surveyed fishermen stated: “purchasing a license is a small cost, which contributes to upholding the overall health of the local waters.” On the other hand, another fisherman stated: “[The recreational fishing license] I think should be free. Taken from tax money on gear.” Thus, we can grasp that the motivation to purchase a license affects their views on the license program. Recreational fishermen’s motivations to purchase a recreational fishing license in the survey remained split into two main ideas: “it is the law” and “I like to support proper fisheries management,” as can be seen in the appendix. Although most of the fishermen purchase their license primarily because it is the law, the majority of fishermen who like to support proper fisheries management were more accepting of the current cost of their fishing licenses. From those fishermen who like to support fisheries management, 85% agreed that the price which they purchase the recreational fishing license is reasonable or “fair,” and only 9% believe that the price is too high. In contrast, for the fishermen that purchased their license because it is legally required, 79% think the price is fair and 19% think it is too high. The following figures show the range and distribution of the fairness of the

recreational fishing license prices as perceived by fishermen who purchase their license because they want to support proper fisheries management, and the fairness as perceived by those who purchase licenses as obligated by the law.

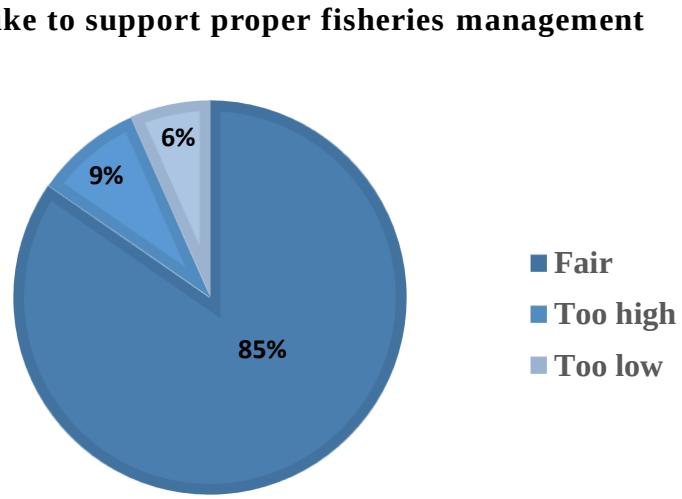


Figure 5, *Represents the satisfaction about the license price for recreational fishermen who purchase fishing licenses to support proper fisheries management.*

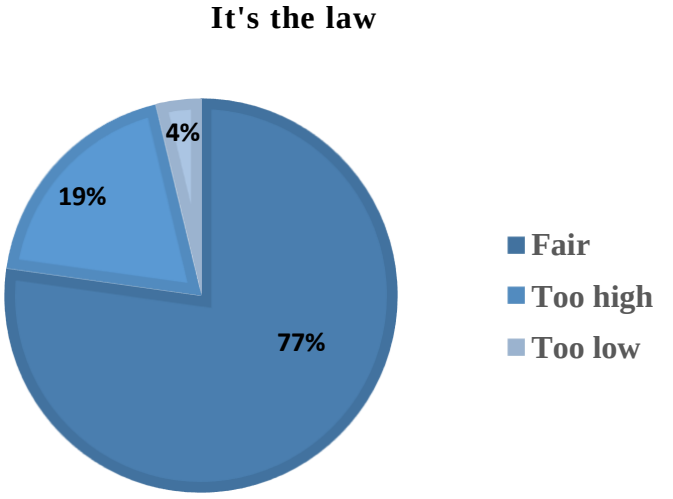


Figure 6, *Represents the satisfaction about the license price for recreational fishermen who purchase fishing licenses because it is the law.*

When Rhode Island was in the preliminary stages of forming its recreational fishing license program, the public was extremely helpful and involved in providing suggestions for the program. Later, when the bill went through the state legislature to be passed, the bill was initially vetoed. However, the fishermen and the surrounding community were vital towards successfully getting the bill passed the second time. If not for their willingness to support proper fisheries management and their enthusiasm, Rhode Island would not have been able to create their recreational fishing license program.

Analysis. Through the purchase of a recreational fishing license, the fishermen can financially support fisheries management agencies responsible for their local waterways.

Finding: There is an aging demographic in the recreational fishing industry.

Summary of Evidence: The Massachusetts and Rhode Island interviews revealed that there is an aging demographic within recreational fishing.

Explanation: The aging demographic is cause for alarm since there needs to be a large enough recreational fishermen population to warrant such extensive recreational fishing license programs. An aging demographic reveals that there is an overall decrease in fishing and its popularity meaning that will be less generated revenue. In addition, several states have free licenses for fishermen of ages 65 and older or for children up until age 16 or 17. These free licenses limit the amount of generated revenue. In conjunction with the aging demographic, they either qualify for free licenses or stop fishing when they physically cannot anymore. To remain involved in the issue, Rhode Island is dedicated towards attracting a younger generation towards fishing by hosting fishing camps multiple times a year for children, creating mentoring programs for novice fishermen, and implementing education and training programs. Similarly, in Massachusetts, the average age for a recreational fisherman is over 50 years. Currently, the state has focused on an education program through magazines and other outreach initiatives. Their education program is still in its infancy along with a limited amount of funds and staffing. However, they are addressing the issue and acknowledge that more actions need to be implemented. For example, both Massachusetts Rhode Island along with several other states

have implemented free fishing days. These free fishing days are an attempt to involve more people in fishing and gain more popularity for fishing in general. They have hosted community panel sessions to reach out to fishing groups and casual anglers. Although, it is important to note that it is difficult to reach the average casual angler.

Analysis: It's important to address the aging demographic of recreational fishing and maintain efforts to recruit younger members. Although it makes the most sense for the environment to let numbers dwindle, it is best for the recreational fishing license program and its general department to maintain numbers to ensure a steady state of revenue from the fishing licenses and the federal government. It is this revenue that directly helps improving the local fishery and help tackle overfishing in general.

Finding: Recreational fishing license programs need to focus on having a transparent relationship with the public.

Summary of Evidence. The Arkansas, Michigan, and Nantucket interviews revealed that there are struggles with maintaining transparency with the public since it is difficult to reach the entire desired demographic.

Explanation. To help improve communication and transparency with the public, Arkansas, Michigan, and Nantucket have established several basic protocols that help strengthen public relations. Nantucket has been active in using social media to better disseminate their information through platforms such as Twitter, Facebook, and Instagram. In addition, Nantucket has now separated the different jobs and duties between different officers whereas in the past, the same people would be appointed to multiple posts. Now, they have a biologist strictly dedicated towards carrying out research and an officer for enforcing the law. This separation of power helps improve relations with the public since department officials no longer have conflicts of interest in their job. Michigan has a created a specific department to improve relations with the public through classroom programs, interpreters, educators, social media platforms, town meetings, and public opinion surveys. Furthermore, Michigan has a $1 surcharge when a combination of fishing or hunting licenses are purchased that is specifically used to further

educate the public about "the benefits of hunting, fishing, and trapping in Michigan, and the impact of these activities on the conservation, preservation, and management of the state's natural resources". This helped further improve the public's opinion of fishing licenses once the reasoning behind the department's actions were justified. Arkansas realizes that keeping the public informed is vital towards building trust within the agency and having them be political supporters. Arkansas uses a variety of communication means that include online surveys, public meetings, making all data and reports available.

Analysis. There will always be challenges with maintaining recreational fishing licenses that are vital towards the structure of license fees. However, maintaining a transparent policy with the public and involvement is the best course of action to address these challenges. Allowing for as much information as possible to remain accessible by the public will best allow the states' respective department to better serve its purpose.

Finding: The reasoning and process of determining the prices for recreational fishing licenses varies between all states.

Summary of Evidence. Interviews with different state agencies and research conducted by the group provided us with varying responses for how states determine their fishing license prices.

- California uses a continuous Gross Domestic Product (GDP) deflator to determine license prices.
- New Hampshire started using a GDP deflator for some license prices as of 2016.
- Arkansas does not use a GDP deflator because they are one of the few agencies who receive outside funding sources from a conservation tax.
- Massachusetts compared its prices to the national average of the time and does not use a GDP deflator.
- Rhode Island partnered with a major fishing vendor organization to help determine the appropriate license fee.
- Rhode Island and Massachusetts have different methods of how they attached different fees onto the existing recreational fishing license fee.

- 49 out of 50 states have different recreational fishing license prices for non-residents and residents.

Explanation. We contacted two states, California and New Hampshire, that used a GDP deflator to calculate license prices. California has been using the GDP deflator continuously since the recreational fishing license program's inception to gauge what price will cover operating costs for the upcoming year. Between 2010 and 2017, California's annual resident fishing license price increased 5 separate times from $39.50 to $43.50. While New Hampshire also used a GDP deflator, the process for price determination varied a bit. In 2016, the Fish and Game Department's records revealed that freshwater fishing and hunting combination license price had not changed prior to 2003. In the past, the Fish and Game Department could utilize the Fish and Game Fund to address any shortfalls. Today, that fund would have a negative balance if the legislature had not provided some state general funds. As a result, the department had to either implement fee increases or eliminate programs for sportsmen and sportswomen. The price for the combined hunting and fishing license was consequently increased from $44 to $54 according to the GDP deflator.

While California and New Hampshire use a GDP deflator, in Arkansas, Massachusetts, and Rhode Island, the fishing licenses agencies do not currently use one to determine the prices of recreational fishing licenses. In Arkansas, the Game and Fish Commission has not recommended a fishing license price increase since the early 1990s, and so their license revenue has not increased to keep up with inflation. However, the state's agency is one of the few that has a dedicated funding source from a 1/8% "conservation sales tax". The Commission receives 45% of the revenue generated from that tax. As a result, politicians are not inclined to raise the license prices because the agency receives these tax proceeds. The revenue generated was used to cover the cost of license administration and to create a profit that focuses on improving the state's aquatic resources. At the time of the Massachusetts recreational fishing license program's creation in 2010, the median price of an annual recreational fishing license in the US was $15. The Massachusetts Division of Marine Fisheries chose to make their license $10 to appear more "palatable" to any prospective fishermen. The price has not been updated since the creation of the program, and the agency has no plans to update it in the near future to keep up with inflation. The Rhode Island Department of Environmental Management (RIDEM) determined the price of

a recreational license in partnership with the Rhode Island Saltwater Anglers Association (RISAA). By catering to the suggested $7 for a resident annual license that RISAA vouched for, the RIDEM gained enough public support to pass the license fees through legislature from the anglers. It is currently in law that the license prices cannot change.

Different methods are also used to update license prices such as including additional fees to the existing license prices. Because agencies have to pay vendors such as sporting goods stores or software companies, they often charge additional money to license purchasers. Massachusetts adds these fees to the license at the time of checkout for purchasing the license. In contrast, Rhode Island includes these fees in the additional price of their license, to appear more transparent. In the appendix, table of states license prices, that shows the different license prices by state. The wild variance of prices between each state. The difference between each state reveals how the process for determining license fees is not the same across the US.

Analysis. When determining the prices of licenses, it is important to take into account the public reaction to the use of a GDP deflator. Without the proper explanation, an always increasing price can upset the public. States that do not periodically increase their prices might have to reconsider license prices in the future to cover the costs of their programs.

Finding: There are two general options to manage license fees and distribute their profits: placing revenue in the general funds for the local government or use a restricted receipt account within the department.

Summary of Evidence. Our interviews with Arkansas, Massachusetts, New Mexico, and Rhode Island along with our survey revealed new trends regarding how to manage and distribute license fees:

- Arkansas puts their revenue into their state's general funds.
- Massachusetts has their funds go into a different fund than the state's general fund.
- Rhode Island has a separate restricted receipt account to place funds in.
- New Mexico has had success with how they distribute their funds.
- Survey: 69% of fishermen want funds to go towards improving water access.

Explanation. The Arkansas legislature chooses all the fishing and hunting license prices and the agency can only provide minimal input. All the profits from fishing license sales go directly into the general fund which can be utilized for anything the agency desires. This poses a problem since the department cannot directly use their fees as they see fit. There are no specifics that state where any portion of these funds should be dedicated. Massachusetts sets aside about a third of their profits that specifically go towards improving public access through piers, boat ramps, and purchasing land for fishing use. Having a designated portion of the profits set aside as such allows for their department to manage their fisheries without the need for external funding. Similarly, to Massachusetts, Rhode Island has created a separate restricted receipt fund where all their fishing license revenue goes into instead of a general fund. The receiver fund is like a savings account for the department where they can budget and portion out the funds exactly how they specify it. Oftentimes, if the revenue is placed into a general fund it is very difficult for the department to receive that money back again. In addition, Rhode Island has a "rolling sum of cash" concept. Through the creation of this fund, they have established a "cushion" of funds. They do not use all their funds every fiscal year but opt to carry over any profits that did not get used into the next upcoming year. This concept allows the department to help fund different projects that their budget did not foresee.

New Mexico focuses on distributing their license funds to mainly manage and improve aquatic habitats. Their department has spent millions of dollars on improving native and recreational fisheries over the past 5 years. Through this program, they have seen overall, positive effects.

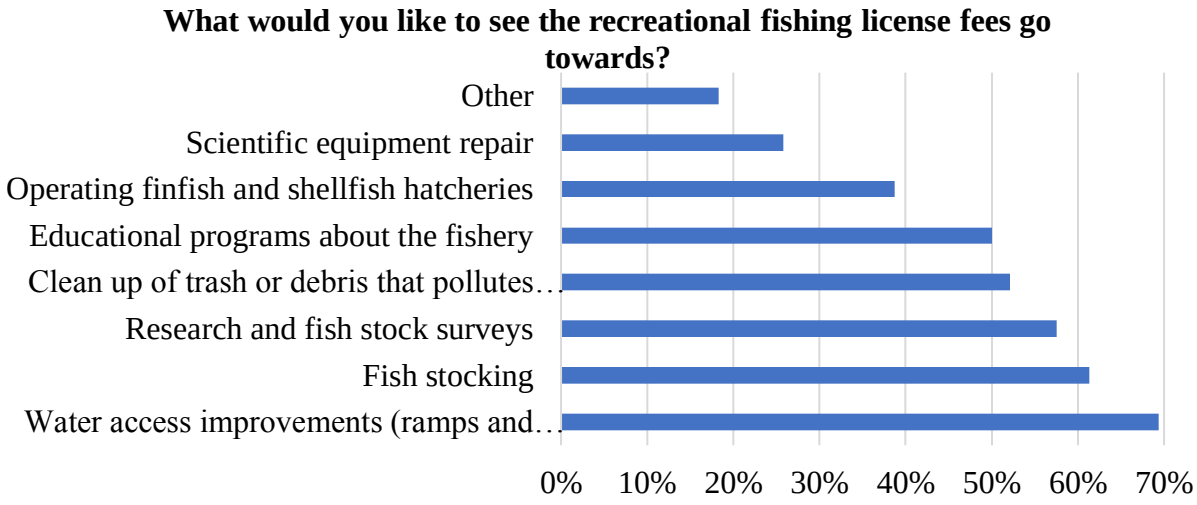


Figure 7, *Survey Question on Fund Allocation, (Answer format: choose all that apply)*

Based on our survey, 69% of recreational fishermen wanted their license funds to be used for improving water access such as building or repairing boat ramps and docks. The survey coincides the with our interviews by proving that specifically allocating funds is integral towards managing a fishery and their fees. Taking into consideration of fishermen's suggestions is an important part of structuring license fees since the fishermen have an extensive base of knowledge that can be used.

Analysis. When determining the allocation of licenses, it is important to take into consideration all viable options. Furthermore, when distributing funds, the state should listen to the public and respect their opinions. States that do not have direct control over license revenue should research other options on how to supplement the gap of funding.

Finding: The lengths of multiple day recreational fishing licenses vary from state to state.

***Summary of Evidence*.** Through our research, we collected all of the different length recreational fishing licenses available across the US.

Explanation. State licensing agencies that responded to our interviews gave varying responses on how they determined what short-term licenses lengths to offer. Arkansas responded that their 1, 3, and 7 day licenses were chosen because neighboring states had success with these length

licenses. In addition, Arkansas took into account public requests for certain length fishing licenses. Michigan responded that their 1 and 3 day licenses were predominantly geared toward the non-resident vacation angler. The intervals were chosen around flexibly of the amount of fishing they do. Each day essentially is priced at 10 dollars, so the non-resident angler has multiple options to choose from to fish the desired amount of days with a consistent cost value. Rhode Island has different length licenses between their freshwater and saltwater licenses. A 3 day freshwater fishing licenses can be purchased, while the multiple day option for saltwater licenses is 7 days. Rhode Island responded that had no reasoning behind the specific lengths, rather the department just wanted give options outside of the yearlong license.

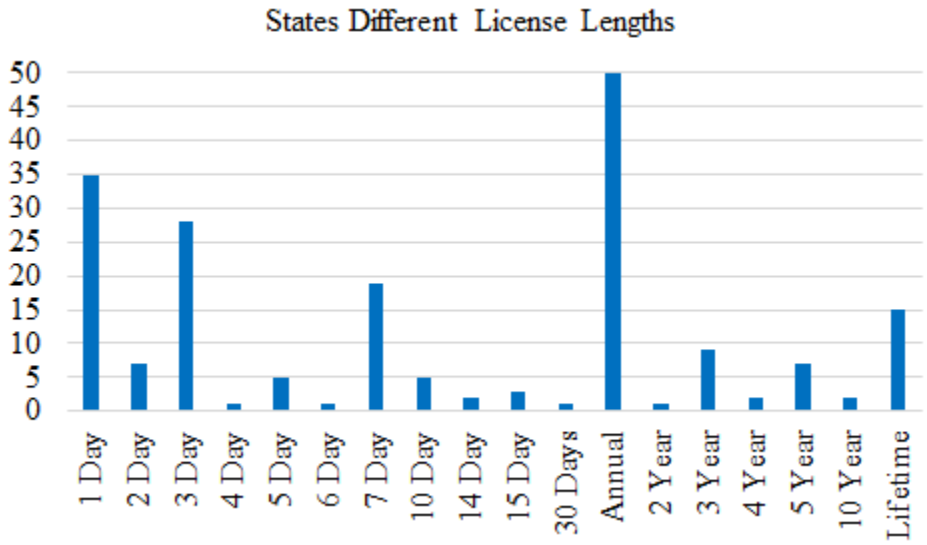


Figure 8, *Shows the states different recreational fishing license lengths*

Analysis. The various lengths of multiple day licenses and the various responses we received regarding how the options were determined shows that choosing the short-term license lengths is not an arduous decision. Using logic about how long tourists stay in a given location, and combining that with suggestions gathered from already existing license programs can prove to produce a successful fleet of multiple day licenses. Keeping options as simple as possible was typically a response from many state agencies.

Finding: Recreational fishing licenses fees are distributed differently in marine and inland projects due to public desires.

Summary of Evidence. Our interviews with Rhode Island, Arkansas, and Massachusetts along with our recreational fishermen survey revealed new trends regarding how recreational license fees are distributed.

- The Rhode Island Department of Environmental Management stated that its saltwater improvement projects funds are dedicated mostly to water access and boat ramp repairs.
- Massachusetts set aside one third of saltwater license sale revenues for public access improvements such as management of piers and the purchasing of land for fishing use.
- Arkansas, a freshwater only state, gave examples fish stocking and fish habitat improvement projects as the main use of funds.
- Of the surveyed freshwater only fishermen, the most popular use of license revenue was fishing stocking (85% of fishermen).

Explanation. The Atlantic Ocean and Scituate Reservoir (Rhode Island's major river) are bodies of saltwater and the majority of the water surrounding Rhode Island is saltwater (Encyclopedia Britannica, 2014). The members of the Rhode Island Department of Environmental Management reach out to local angler clubs at least once or twice a year to host meetings. In these meetings, the recreational fishermen's main issues were traveling in and out the marinas with commercial fishermen as well as boat ramps deteriorating overtime from the saltwater. From this, the funding from the recreational fishing licenses is used in those two main issues to appease the angler clubs in Rhode Island. This is similar in Massachusetts, home to over 400 marinas, when they hear the same issues from their recreational fishermen (Massachusetts Office of Coastal Zone Management, 2001).

In contrast to Rhode Island and Massachusetts, Arkansas only contains freshwater. The freshwater in Arkansas is confined in the numerous lakes and rivers surrounding the state. In the interview with Arkansas Department of Natural Resources's marketing director Jason Oliver, he mentioned how working with a state that only has freshwater has different needs compared to states with coastal access. The majority of their recreational fishing licensing fees goes towards fish stocking and habitat improvement. Unlike marinas and other bodies of saltwater, fish

populations remain in the freshwater lakes and rivers. Therefore, the need for keeping these habitats safe is far greater than what other saltwater states prioritize. With a cleaner habitat, fish stocking also increases. This trend continues from our Qualtrics survey where 85% of freshwater recreational fishermen would like to see the revenue of the licenses go directly towards fish stocking.

Analysis: When determining where licensing fees are distributed, it is important to take into account what the public desires. The difference between inland water bodies and saltwater surroundings also plays an important part in determining the distribution of fees. Michael Armstrong, a member of the Massachusetts Department of Fish and Game Marine Division, said that “Managing a fishery is like managing a forest, except it’s always night and the trees move". Essentially, managing a marine based fishery has its challenges with fish constantly migrating whereas a freshwater, inland area has the challenges of sustaining a good habitat to keep the same fish safe.

Finding: Fishermen are willing to pay more money for their recreational fishing licenses if they know how funds of the licenses are distributed.

Summary of the Evidence. The recreational fishermen surveyed across the US, personal research, and the interview with the Rhode Island Department of Environmental Management revealed the following information:

- 77% of the recreational fishermen surveyed are willing to spend more money on their recreational fishing license if they know that the money spent on their license is going to improve the local fisheries.
- We researched each state's website to determine how simple it is to find information on fee allocation on their webpage.

Explanation. Some states are already making attempts to simplify their license program and make recreational fishing more accessible for the public. For example, according to an interview with the Rhode Island Department of Environmental Management, Rhode Island wants to combine their freshwater and saltwater fishing licenses under an “all outdoors license” with a

singular price to make everything simpler and easier for everyone. Their current cost for an annual resident saltwater fishing license is $7, and their freshwater license costs $18. This all outdoors license would combine these two licenses with their current hunting license as a method to simplify the licensing process for the casual consumers as well as dedicated hunters and fishermen.

More transparency in fishing license fund allocation also increases support for recreational fishing licenses and fisheries management. From our survey, we discovered that people are willing to spend extra money on fisheries management if they know that their money is being used for fisheries management. From all the fishermen surveyed, 77% stated that they would spend extra money on a recreational fishing license if its license fees were used to improve fisheries. These fishermen that can be persuaded to spend more money on their fishing license are willing to spend on average an additional $21.00 on top of their original recreational fishing license cost. If the process of purchasing a license is more straightforward and finding how license funds are allocated on state DNR websites, they could be willing to spend more money.

The following figure shows the percentage of surveyed recreational fishermen who are willing to spend more on their licenses when informed of where their fees are going, as well as the question as it appears in the survey.

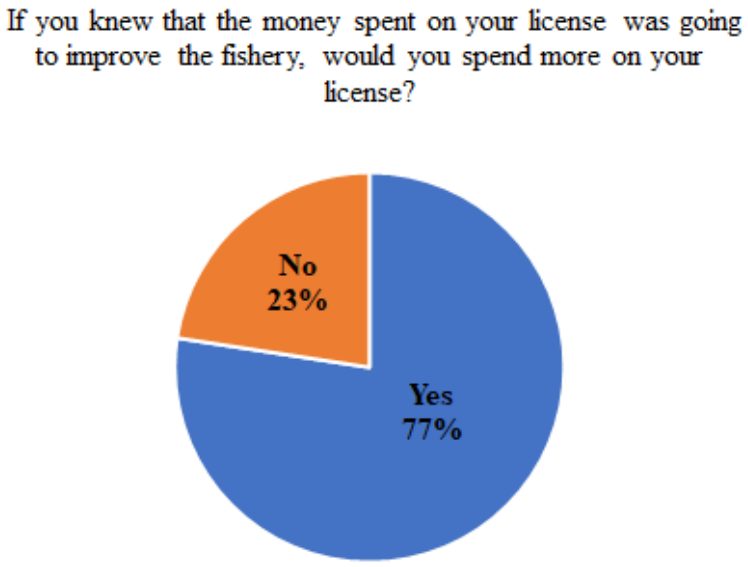


Figure 9, *Represents the number of recreational fishermen willing to pay more than their current recreational fishing license cost when informed that their money will improve fisheries.*

Our personal research determined how simple it is for a potential customer to discover how their money will be used online. 52% of states were transparent and it was easy to find their statement on fund allocation within a few clicks. However, the remaining 48% of states we could not find a statement on their webpage. Making it difficult to find where their funds are can dissuade potential customers from purchasing a license.

Finding: People are willing to pay for nonresident license fees regardless of the fee.

Summary of Evidence. One of the questions on our recreational fishermen survey asked if the price of an out of state license change the decision to go on a trip to that certain location.

- Only 12.5% of recreational fishermen said that the price would affect their decision to go on the trip.

Explanation. Out of the 190 passionate recreational fishermen that responded to our recreational fishermen survey, the small percentage of fishermen that responded that a certain license price would affect their decision to go to another location to fish showcases an agencies ability to make out of state residents pay more for license prices.

Analysis. Environmental government organizations have the ability to gain more revenue through nonresident fishing licenses if they have higher prices on such licenses.

Recommendations

From our findings, we created a list of recommendations that are described in further detail below.

Involve the public as much as possible with fisheries management since they are willing to financially support it.

The Puerto Rico DNER should contact the larger fishermen associations in the area and invite them in for a discussion about the need for recreational fishing licenses fees to help support projects to enhance the island's fishery. Previously in Puerto Rico's history, fishermen associations have become lobbying agencies for the fishermen by serving their social, economic, and political interests. If you can inform the organizations of the benefits of fishing licenses and the harms that come with an ill managed fishery, they will be more understanding moving forward. Fishermen organizations support has previously allowed licensing organizations such as Rhode Island's to get license fees passed through Legislature.

Come with the full plan laid out for the fisherman organizations to view and make logical changes according to the organizations' views. To an extent, try to cater to the fishermen's requests. It will benefit the program in the long run. Having their views included in the program only increases the chances that the program will succeed. Do not get caught up in pleasing everybody. From our experience talking with agencies, we have learned how difficult it can be to get through to fishermen when trying to change the way the fishery is run. You have to ask their opinions, but often, responses will vary from fisherman to fisherman. From our interviews at the Nantucket Shellfish Hatchery, they explained communicating with fishermen was difficult by inferring, "if you ask 50 fishermen what time it is, you will get 50 different answers."

Include information about where license prices go.

Licensing organizations such as Minnesota have had success posting documents and reports informing fishermen where the license funds are allocated on websites.
The agency has experienced positive responses due to their level of transparency about license prices.

Do not stress over the length of the multiday licenses.

The state agencies that were interviewed did not have concrete evidence to justify why they chose certain lengths for multiday licenses. The most popular lengths of short-term licenses were 1,3, and 7 days. These lengths allow visiting fishermen to fish for a day, a long weekend, or a week, all of which are typical vacation lengths. We suggest that you start with these lengths of time, and then see how fishermen react.

Include the vendor fee in the original price of the license.

A vendor fee is the additional money the agency pays to outside businesses like online distributors or sporting goods stores to distribute the licenses to the public. Of course, to use these companies for distribution purposes, it costs money. To cover these costs, environmental governmental organizations use two different methods. For example, the Rhode Island Department of Environmental Management originally includes a vendor fee in the license price. So when a fisherman goes to purchase a $7 annual license, it actually costs $7. In contrast, The Massachusetts Division of Fisheries includes the vendor fee at the "checkout point" of the license purchase. So when a fisherman goes to purchase a $10 annual license, it costs more than $10. To back up our suggestion, since Puerto Rico DNER has had trouble gaining support for the recreational license program, follow the first option and follow Rhode Island's lead. Combined license fees make the organization appear more transparent to the public.

Do further studies into whether you should use a GDP deflator or a constant year to year price for the license fee structure.

Our group did not come to the decision of whether the Puerto Rico DNER should use a GDP Deflator or a consistent year to year license price. Massachusetts, Rhode Island and Arkansas have not seen issues with their consistent license pricing techniques, but New Hampshire did.

If the DNER decides a GDP Deflator is necessary, hear the fishermen's concerns about increasing license prices and come up with a plan to fully explain the choice to the fishermen. If a constant year to year price is suggested, make sure that the idea of a possible need to increase the license price in the future is known.

Have separate licenses for resident and nonresident

We suggest that the Puerto Rico DNER provide differently priced license options for both in state and out of state residents. From our survey, only 12% of the fishermen said they would reconsider an out of state fishing trip because of the price of the fishing license in that location. The non-resident licenses can cost more than the resident licenses.

Provide an additional option for customers purchasing a recreational fishing license where they can donate more money towards the department.

From our survey, we discovered that recreational fishermen are willing to pay $39 for a license, which is above the average license price for most states. Providing a donation option when purchasing a license provides customers with the option if they so wish, and it allows for an increasing profit margin for the department to further improve and better manage fisheries. In addition, a donation option can further incentivize customers to pay more since the extra payment could be classified as tax deductible.

Carry out more research on whether to use a restricted receipt account for license revenue or set aside revenue

Putting license revenue into a restricted receipt account allows the department to maintain full control of the funds. In addition, the department can determine where and how their funds will be used as they see fit. Revenue placed in a general state fund will be difficult for the department to receive all necessary funds to best manage fisheries. In addition, setting aside revenue can allow the department to create a cushion of funds that can be used for future projects in the next fiscal years.

Work with the Active Outdoors Network Software

The Active Outdoors Network Software's automated licensing sales system enables agencies to issue and deliver licenses, permits, stamps, tags and other privileges for outdoor activity in real-time. The system reduces the time and complications associated with issuing licenses manually, allowing agencies to concentrate on conservation management.

The software also allows agencies to sell and distribute retail and informational materials such as apparel, supplies, books, and maps. Educational PDFs about safe fishing practices or how the fishing license money is used can be included with the purchase of the license. 17 states and 1 non-US territory use the Active Outdoors Network as their primary vendor.

Some cautions about using the software include in 2016, the Idaho Active Outdoors Network page encountered a data breach at sometime over the summer. Personal information including name, age, address, and Social Security Number were potentially accessed and compromised. In addition, some state agencies that we talked to express their displeasure for the time it took for the Active Outdoors Network Software customer support to respond. Often times, the agencies had to wait days or weeks for a response.

Use license revenue to fund educational fishing programs for all ages.

Educational and outreach programs can benefit the DNER in two ways. One reason is that the programs can be used to increase the number of youth interested in fishing. If intrigued in fishing from a young age, more children will eventually be the adult residents purchasing licenses in the future. In most states, residents over the age of 65 do not pay for fishing licenses. More young fishermen are necessary to increase the population that will be purchasing the licenses in the future. The only way to keep the revenue generated from fishing licenses constant is to make sure that the amount of people that are entering the activity of fishing match or exceed that of the amount of people that are exiting fishing.

The second reason for educational and outreach programs is to teach fishermen how to properly and safely fish. The Massachusetts Division of Marine Fisheries told us that there was a higher mortality rate of striped bass from not being properly hooked than there were from fish harvest. Better fishing practices can lead to healthier fish stocks.

Have a separation of positions when possible; do not have the biologist be the law enforcement as well, seeing that it causes tensions in the fishing community.

The Nantucket Shellfish Association warned against employing people as both biologists and as the law enforcement. Recreational fishermen see it as a conflict of interest, and this

tension leads them to report biological incidents less frequently. While enforcement is a high priority, monitoring every single recreational fisherman is unrealistic. However, keeping good relations between biologists and the fishermen allows for self-reporting of biological and legal incidents. We suggest the DNER have a warden for fisheries law enforcement and a separate staff member as a resident biologist to keep their positions and relationships with recreational fishermen distinct.

Bibliography

A contribution to the Millennium Ecosystem Assessment, & prepared the Caribbean Sea Ecosystem Assessment Team. (2007). Caribbean Sea ecosystem assessment (CARSEA) Caribbean Environment Program. Retrieved from http://cep.unep.org/publications-and-resources/databases/document-database/other/caribbean-sea-assessment-report-2007.pdf/view?searchterm=puerto+rico+overfishing

Agar, J., Shivlani, M., & Solís, D. (2017). The commercial trap fishery in the commonwealth of Puerto Rico: An economic, social, and technological profile. North American Journal of Fisheries Management, 37(4), 778. doi:10.1080/02755947.2017.1317678

Allen, T., Southwick, R., & Howlett, D. (2013). Sportfishing in America an economic force for conservation (PDF No. 2). Online: American Sportfishing Association.

Arlinghaus, R., Tillner, R., & Bork, M. (2015). Explaining participation rates in recreational fishing across industrialised countries. Fisheries Management and Ecology, 22(1), 45-55. doi:10.1111/fme.12075

Beddington, J. R., & Rettig, R. B. (1983). Approaches to the regulation of fishing effort. Rome: Retrieved from http://www.econis.eu/PPNSET?PPN=040261107

Bernard, H. R. (1995). *Research methods in anthropology* (2. ed. ed.). Walnut Creek, CA [u.a.]: AltaMira Press.

Blinkoff, K. (2011). *Maine does away with fee-based saltwater fishing license* .http://www.onthewater.com/maine-does-away-with-fee-based-saltwater-fishing-license/

California Department of Fish and Wildlife. (2017). *Sport fishing fees reported by license year*. California Department of Fish and Wildlife.

California Sportfishing League. (2015). *Are costs, lack of value contributing factors to an unprecedented decline of recreational fishing in california?*

Chapman, L. (2012). *Qualtrics taps accel, sequoia for first-ever VC round*.https://blogs.wsj.com/venturecapital/2012/05/15/qualtrics-taps-accel-sequoia-for-first-ever-vc-round/

Christensen, V., Coll, M., Piroddi, C., Steenbeek, J., Buszowski, J., & Daniel, P. A century of fish biomass decline in the ocean. Retrieved from http://hdl.handle.net/10261/104259

Clements, J., Feliciano, V., & Colgan, D. C. (2016). Describing the ocean economies of the U.S. virgin island and Puerto Rico.

Cochrane, K. L. (2002). A fishery manager's guidebook: Management measures and their application. Rome: Food and Agriculture Organization of the United Nations.

Committee on Fisheries. (1994). Improving the management of U.S. marine fisheries. Washington, D.C.: National Academy Press. doi:10.17226/9045

Cooke, S. J., & Cox, I. G. (2004). The role of recreational fishing in global fish crises. *BioScience, 54*(9), 857-859. doi:TRORFI]2.0.CO;2

Critical Ecosystem Partnership Fund. (2016). CEPF biodiversity. http://www.cepf.net/Pages/default.aspx

Durrell Conservation. (2016). Retrieved Sep 17, 2017, from https://www.durrell.org/wildlife/conservation/our-approach/programmes/

Encyclopedia Britannica. (2014). *Rhode island | history*. https://www.britannica.com/place/Rhode-Island-state

FAO. (2012). Technical guidelines for responsible fisheries: Recreational fisheries. (). Rome: Food and Agriculture Organization of the United Nations.

Fisheries, N. (2017). Laws & policies | NOAA fisheries. Retrieved Oct 30, 2017, from /topic/laws-policies

Florida Fish and Wildlife Conservation Commission. (2017). How can I help? Retrieved from http://myfwc.com/wildlifehabitats/managed/manatee/how-to-help/

Florida Fish and Wildlife Conservation Commission. (2017). *License free fishing days.* http://myfwc.com/license/recreational/do-i-need-a-license/free-fishing/

Food and Agriculture Organization of the United Nations, & Environment Complete. (1996). FAO technical guidelines for responsible fisheries

Food and Agriculture Organization of the United Nations. (1997). Fisheries management.

Hunt, L. M., Bannister, A. E., Drake, D. A., Fera, S. A., & Johnson, T. B. (2017). Do fish drive recreational fishing license sales? North American Journal of Fisheries Management, 37(1), 122-132. doi:10.1080/02755947.2016.1245224

Index to resolutions of the general assembly. New York, NY: UN.

Kourous, G. (2005). Many of the world's poorest people depend on fish. http://www.fao.org/Newsroom/en/news/2005/102911/index.html

Krishna, K. (1989). *Conducting key informant interviews in developing countries* United States. Agency for International Development (USAID).

Ley de Incentivos de la Pesca Deportiva y Recreativa, Administrative U.S.C. (1997).

Ley de Pesca del Estado Libre Asociado de Puerto Rico: Ley de Pesca del Estado Libre Asociado de Puerto Rico: 18va Asamblea Legislativa, 1ra. Sesion Ordinaria (2017).

Lilyestrom, C., Garcia, M., Rodriguez, G. & Rodriguez, Y. (2013). Puerto Rico marine recreational fisheries statistics program & nbsp; file:///Users/Marlies/Downloads/DRNA_RecreationalFisheriesStatistics_2009-2013.pdf

Marine Stewardship Council. (2017). The impact on communities., 2017, from https://20.msc.org/es/en/what-we-are-doing/oceans-at-risk/the-impact-on-communities

Marrero, M. E. (2012). Sustainable fishing. Retrieved from https://www.nationalgeographic.org/encyclopedia/sustainable-fishing/

Marshall, MN. (1996). The key informant technique. Family Practice; Volume 13, 92-97.

Martin, S. (2012). Customer research easier in digital era. *USA Today,* Retrieved from http://usatoday30.usatoday.com/MONEY/usaedition/2012-08-28-Efficient-Small-Business-Ecommerce_CV_U.htm

Massachusetts Office of Coastal Zone Management. (2001). Publications list for the massachusetts office of coastal zone management. Retrieved from http://www.thefisherman.com/index.cfm/fuseaction/page.sitemap/alphaSearch/All/index.cfm/feature/108/

Matos-Caraballo, D. (2012). Puerto Rico/NMFS Cooperative Fisheries Statistics Program April 2007 – September 2012. Department of Natural and Environmental Resources.

Matos-Caraballo, D., & Agar, J. (2011). Comprehensive Census of the Marine Commercial Fishery of Puerto Rico, 2008, Marine Fisheries Review, 73(1), 13.

McMurrey, D. (1997). Recommendation and feasibility reports. https://www.prismnet.com/~hcexres/textbook/feas.html

Muñoz, E (2010). Reglamento de Pesca de Puerto Rico-2010, Reglamento U.S.C. 1 (2010).

Nantucket Shellfish Association. (2016). Nantucketbayscallops.org. Retrieved from http://www.nantucketbayscallops.org/nantucket-shellfish-association.html

Nantucket Shellfish Management Plan Committee. (2012). Nantucket shellfish management plan. ().

National Geographic Society (2011). Marine reserve. National Geographic Society. Retrieved Oct 9, 2017, from http://www.nationalgeographic.org/encyclopedia/marine-reserve/

NOAA. (2008). *NOAA to create saltwater angler registry in 2010*.http://www.noaanews.noaa.gov/stories2008/20081223_registry.html

NOAA. (2010). *National saltwater angler registry*.https://www.countmyfish.noaa.gov/register/

Nomura, I. (2008). Fisheries management: Status and challenges

North-East Atlantic Fisheries Commission. (2011). Retrieved from https://www.neafc.org/about

Northwest Atlantic fisheries organization (2010).

Pacific Fishery Management Council. (2013, 12/09/). Marine reserves and marine protected areas | Pacific Fishery Management Council. Message posted to https://www.pcouncil.org/habitat-and-communities/marine-protected-areas/

Pawson, M., & Cefas. (2007). The definition and legal position of marine recreational fishing in Europe. http://nsrac.org/wp-content/uploads/2009/09/wp06_wd20071115_Recreational_fishing_definitions.pdf

Shiffman, D. (2014). Predatory fish have declined by two thirds in the 20th century. Retrieved Oct 31, 2017, from https://www.scientificamerican.com/article/predatory-fish-have-declined-by-two-thirds-in-the-20th-century/

South East Atlantic Fisheries Organization (SEAFO). (2017). Retrieved from http://www.seafo.org/About

Stanford, ©. S. U., & Notice, California 94305 Copyright Complaints Trademark. (2006). Science study predicts collapse of all seafood fisheries by 2050. Retrieved Oct 31, 2017, from http://news.stanford.edu/news/2006/november8/ocean-110806.html

Tremblay-Boyer, L., Gascuel, D., Watson, R., Christensen, V., & Pauly, D. (2011). Modelling the effects of fishing on the biomass of the world's oceans from 1950 to 2006. Marine Ecology Progress Series, 442, 169-185. doi:10.3354/meps09375

UN General Assembly. (1982). Convention on the law of the sea. Retrieved Oct 30, 2017, from http://www.refworld.org/docid/3dd8fd1b4.html

UN General Assembly. (1995). Agreement of straddling and highly migratory fish stocks & nbsp;

United States Department of the Interior. Fish and Wildlife Service. (2013). National survey of fishing, hunting, and wildlife-associated recreation (FHWAR), 2011 ICPSR - Interuniversity Consortium for Political and Social Research.

University of North Carolina. (2017). Ninety percent of predatory fish gone from Caribbean coral reefs due to overfishing. Science Advances, Retrieved from https://phys.org/news/2017-03-percent-predatory-fish-caribbean-coral.html

USDA Forest Services. (2016). Puerto Rico's protected areas map. https://www.fs.usda.gov/detail/iitf/home/?cid=FSEPRD528698

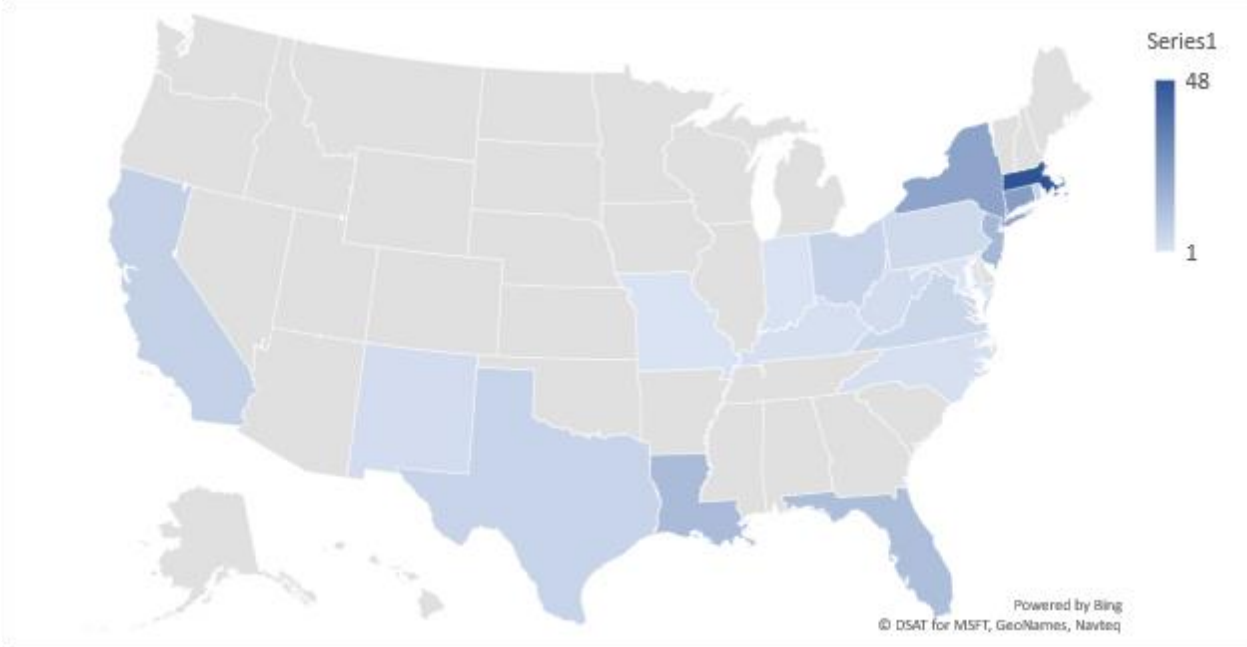
What you need to know about the UNCLOS, the ITLOS, and the EEZ. (2012). Retrieved Oct 30, 2017, from http://www.gmanetwork.com/news/story/256067/news/specialreports/what-you-need-to-know-about-the-unclos-the-itlos-and-the-eez/

World Bank. (2012). Hidden harvest: The global contribution of capture fisheries. (). Washington, DC: International Bank for Reconstruction and Development, 71.

Appendix

Survey for Recreational Fishermen

1. In which state do you currently reside?



2. How often do you go fishing during the season?

#	Answer	%	Count
1	Once a year	0.00%	0
2	A few times a year	9.19%	17
3	Once a month	8.11%	15
4	Once every two weeks	16.76%	31
5	Once a week	25.95%	48
6	Multiple times a week	40.00%	74

3. How much do you spend annually on equipment for fishing?

#	Answer	%	Count
1	$0-99	8%	14
2	$100-499	40%	74
3	$500-999	22%	40
4	More than $1000	31%	57

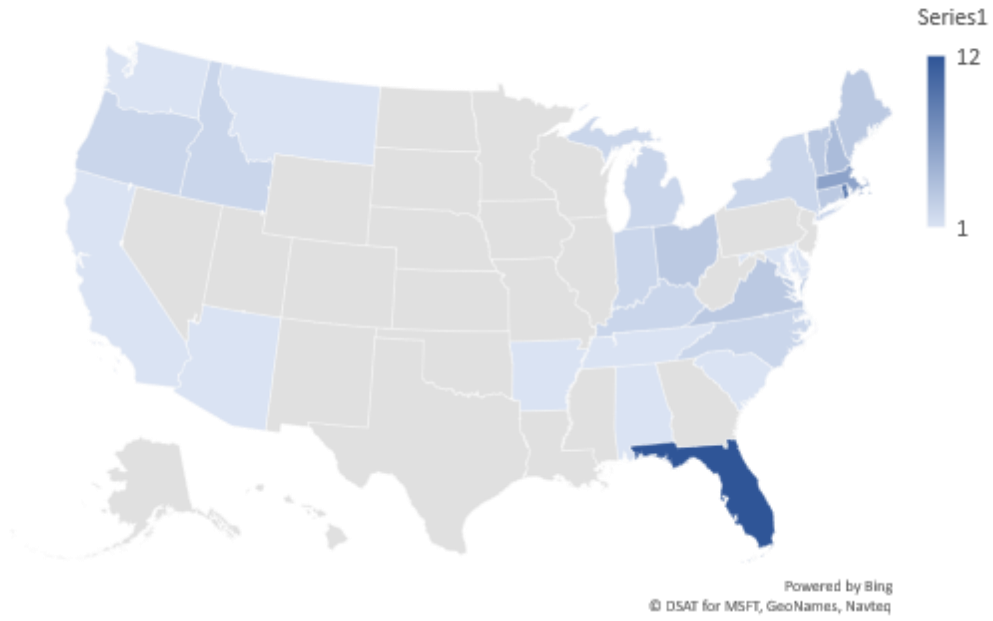
4. How much do you spend on a given fishing trip?

#	Answer	%	Count
1	$0-99	58.15%	107
2	$100-499	35.33%	65
3	$500-999	3.80%	7
4	More than $1000	2.72%	5

5. Did you purchase a recreational fishing license? (chose all that apply?

#	Answer	%	Count
1	Yes, in the same state in which I reside	63.24%	160
2	Yes, in a different state	31.23%	79
3	No	5.53%	14

6. (If Yes, in a different state for Question 5) What state did you purchase your out of state or non-residential recreational fishing license for?



7. (If Yes for Question 5) What kind of recreational license or permit did you purchase? (Choose all that apply)

#	Answer	%	Count
1	Freshwater	48.00%	132
2	Saltwater	47.64%	131
3	Other	4.36%	12

8. (If Yes for Question 5) How long was the license valid for?

#	Answer	%	Count
1	Short term - a year or less	90.23%	157
2	Long term - more than a year	9.77%	17

9. (If Yes for Question 5) Why did you purchase your license? (choose all that apply)

#	Answer	%	Count
1	It's the law	57.71%	161
2	People that I fish with would be upset if I did not purchase	7.53%	21
3	I like to support proper fisheries management	32.97%	92
4	Other	1.79%	5

10. (If No for Question 5) Why didn't you purchase your license? (choose all that apply)

#	Answer	%	Count
1	Price too expensive	6.67%	1
2	No one checks to see if I have a license	0.00%	0
3	I didn't know I needed one	13.33%	2
4	Other	80.00%	12

11. What is your opinion about the price of the fishing license(s) you purchased?

#	Answer	%	Count
1	Too high	17%	31
2	Fair	79%	142
3	Too low	4%	7

12. Do you know what the recreational license fees go towards?

#	Answer	%	Count
1	Yes	71.58%	136
2	No	28.42%	54

13. What would you like to see the recreation fishing license fees go towards? (choose all that apply)

#	Answer	%	Count
1	Educational programs about the fishery	13.41%	94
2	Fish stocking	16.41%	115
3	Scientific equipment repair	6.99%	49
4	Operating finfish and shellfish hatcheries	10.41%	73
5	Water access improvements (ramps and docks)	18.54%	130
6	Research and fish stock surveys	15.41%	108
7	Clean up of trash or debris that pollutes waterways	13.98%	98
8	Other	4.85%	34

14. How much money would you be willing to pay for the recreational fishing license?

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Dollars ($)	0	100	38.2	22.56	509.06	177

15. If you knew that the money spend in your license was going to improve the fishery, would you spend more on your license?

#	Answer	%	Count
1	Yes	77%	144
2	No	23%	42

16. (If yes for question 15) How much more would you be willing to pay in addition to the existing price of the license?

#	Answer	%	Count
7	more than $50	6.29%	9
6	$50	7.69%	11
5	$40	5.59%	8
4	$30	6.99%	10
3	$20	27.97%	40
2	$10	32.17%	46
1	$5	13.29%	19

17. Do you travel to other states or countries to fish?

#	Answer	%	Count
2	Yes, sometimes	58.20%	110
1	Yes, frequently	23.28%	44
3	No	18.52%	35

18. (If Yes for question 17) Would the price of the license change your decision to go on a trip to that location?

#	Answer	%	Count
1	Yes	12.50%	19
2	Maybe	45.39%	69
3	No	42.11%	64

Initial Survey Email for recreational Fishermen Association

Subject: Recreational Fishing Inquiry

Hello,

We are students at Worcester Polytechnic Institute in Worcester, Massachusetts. Currently our team is working with the Department of Natural and Environmental Resources (DNER) in Puerto Rico to help them institute a recreational fishing license program.

Please distribute this survey link to members of your respective angler organization. This survey will take at most 4 minutes to complete, and it will help us understand the opinions of recreational fishermen in regards to recreational fishing licenses. Here is the link to the survey: http://wpi.qualtrics.com/jfe/form/SV_d5WIgVJpn5Jiq9L

This survey is anonymous, but the report of data collected is public and members of your organization will be able to see the overall results once they have completed the survey.

Thank you for your time and we look forward to your organization's responses. Any questions or comments, please email fishingprogramiqp@wpi.edu

Best Regards,

Annual Fishing License Prices for Each State

Annual Fishing License Price			
States	Saltwater	Freshwater	General Fishing
Alabama	$ -	$ 13.30	$ -
Alaska	$ -	$ -	$ 29.00
Arizona	$ -	$ -	$ 37.00
Arkansas	$ -	$ -	$ 10.50
California	$ -	$ -	$ 43.50
Colorado	$ -	$ -	$ 26.00
Connecticut	$ 10.00	$ 28.00	$ -
Delaware	$ -	$ -	$ 8.50
Florida	$ 17.00	$ 17.00	$ 32.50
Georgia	$ 15.00	$ -	$ -
Hawaii	$ -	$ 6.00	$ -
Idaho	$ -	$ -	$ 25.75
Illinois	$ -	$ -	$ 15.00
Indiana	$ -	$ -	$ 17.00
Iowa	$ -	$ -	$ 19.00
Kansas	$ -	$ -	$ 27.50
Kentucky	$ -	$ -	$ 20.00
Louisiana	$ 13.00	$ -	$ 9.50
Maine	$ -	$ -	$ 25.00
Maryland	$ -	$ 20.50	$ -
Massachusetts	$ -	$ -	$ 27.50
Michigan	$ -	$ -	$ 26.00
Minnesota	$ -	$ -	$ 22.00
Mississippi	$ 10.00	$ -	$ -
Missouri	$ -	$ -	$ 12.00
Montana	$ -	$ -	$ 31.00
Nebraska	$ -	$ -	$ 38.00
Nevada	$ -	$ -	$ 29.00
New Hampshire	$ 11.00	$ 45.00	$ -
New Jersey	$ -	$ -	$ 22.50
New Mexico	$ -	$ -	$ 25.00
New York	$ -	$ -	$ 25.00
North Carolina	$ 15.00	$ 20.00	$ 40.00
North Dakota	$ -	$ -	$ 16.00
Ohio	$ -	$ -	$ 19.00
Oklahoma	$ -	$ -	$ 25.00
Oregon	$ -	$ -	$ 41.00

Pennsylvania	$	-	$	-	$	22.90
Rhode Island	$	7.00	$	18.00	$	-
South Carolina	$	10.00	$	10.00	$	-
South Dakota	$	-	$	-	$	28.00
Tennessee	$	-	$	-	$	50.00
Texas	$	35.00	$	30.00	$	-
Utah	$	-	$	-	$	34.00
Vermont	$	-	$	-	$	26.00
Virginia	$	-	$	23.00	$	39.50
Washington	$	30.05	$	29.50	$	-
West Virginia	$	-	$	-	$	19.00
Wisconsin	$	-	$	-	$	20.00
Wyoming	$	-	$	-	$	24.00

Fishing Organizations Contacted to Participate in our Survey

#	Organization Name	State
1	Alaska Fly Fishers	AK
2	Alaska Sport Fishing Alliance	AK
3	Alabama Coastal Fishermans' Association	AL
4	Alabama Kayak Anglers	AL
5	Alaska Salmon Alliance	AL
6	Donavan Lakes Fishing Club	AL
7	Kenai River Sportfishing Association	AL
8	North Alabama Kayak Anglers	AL
9	Sportsman's Alliance for Alaska	AL
10	United Fisherman of Alaska	AL
11	Arkansas Area Catfish Hunters	AR
12	Arkansas Hawg Hunters	AR
13	Bowfishers of Arkansas	AR
14	Arizona BASS Nation	AZ
15	Arizona Flycasters Club	AZ
16	Desert Fly Casters	AZ
17	Bass n Tubes	CA
18	California Fly Fishers Unlimited	CA
19	California Trout	CA
20	Delta Fly Fishers	CA
21	Fly Fishers Club of Orange County	CA
22	Flycasters Inc. of San Jose	CA
23	Golden Gate Angling and Casting Club	CA
24	Golden State Flycasters	CA
25	Golden West Women Flyfishers	CA
26	Kaweah Fly Fishers	CA
27	Mount Tamalpais Fly Fishers	CA
28	Penisula Fly Fishers	CA
29	Rooster Tails Fishing Club of Northern California	CA
30	San Diego Fly Fishers	CA
31	Santa Cruz Fly Fishermen	CA
32	Sierra Pacific Fly Fishes	CA
33	Southern California Deaf Anglers Club	CA
34	Tri-Valley Fly Fishers	CA
35	Wilderness Fly Fishers	CA
36	Colorado Women Fly Fishers	CO
37	Loveland Fishing Club	CO
38	Pikes Peak Fly Fishers	CO
39	West Denver Trout Unlimited	CO

40	Connecticut Fly Fisherman's Association	CT
41	Connecticut Fly Fisherman's Association Inc.	CT
42	Connecticut Surfcasters Association	CT
43	Connecticut/Rhode Island Coastal Flyfishers	CT
44	Farminton River Anglers Association	CT
45	Mianus Chapter of Trout Unlimited	CT
46	MidConn Anglers	CT
47	Mohawk Valley BassCasters, Inc.	CT
48	Northeast Connecticut Bass Club	CT
49	Pachaug Area Bassmasters	CT
50	Seawolf Bassmasters	CT
51	Team Skeeter	CT
52	Thames Valley Trout Unlimited Chapter 282	CT
53	Saltwater Fly Anglers of Delaware	DE
54	Delaware River Fishermen's Association	DE, PA, NJ
55	Fishers of Men	East Division
56	Backcountry Fly Fishing Assoc.	FL
57	Big Bend Fly Casters	FL
58	Boynton Beach Fishing Club	FL
59	Charlotte Harbor Fly Fishers	FL
60	Everglades Bassmasters	FL
61	First Coast Fly Fishers	FL
62	Florida Bid Bend Fly Fishers	FL
63	Fly Fishers of Northwest Florida	FL
64	Kayak Fishing Club of the Palm Beaches	FL
65	Mangrove Coast Fly Fishers	FL
66	Mid-Coast Fly Fishers	FL
67	Naples Fishing Club	FL
68	Nature Coast Anglers	FL
69	Panama City Bassmasters	FL
70	Pine Ridge Fishing Club	FL
71	South Florida Bass Pros	FL
72	Suncoast Fly Fishers	FL
73	Tampa Bay Fly Fishing Club	FL
74	The Bonefish Bonnies	FL
75	Tri County Fly Fishers	FL
76	Atlanta Fly Fishing Club	GA
77	North Cobb Bass Club	GA
78	North Georgia Bass Anglers -	GA
79	North Georgia Crappie Anglers Club	GA
80	Upper Chattahoochee Chapter of Trout Unlimited	GA
81	Hawaii Big Game Fishing Club	HI
82	Fishers of Men Iowa Division	IA

83	Boise Valley Fly FIshers	ID
84	Midstate Illinois Bass Anglers	IL
85	Blackhawk Bassmasters	IL, WI, MI
86	Walleyes Unlimited	IL/WI
87	Indiana Catfish Association	IN
88	Indiana Walleye	IN
89	Indy-Yaks Kayak Fishing Association	IN
90	Johnson County Christian Bassmasters	IN
91	Free State Fly Fishers	KS
92	Olathe Bass Club	KS
93	Olathe Community Sportsman's Club	KS
94	Cabela's King Kat	KY
95	Derby City Fly Fishers	KY
96	H&H Bass club	KY
97	Bayou Coast Kayak Fishing Club	LA
98	Kisatchie Fly Fishers	LA
99	New Orleans Fly Fishers	LA
100	North Louisiana Fly Fishers	LA
101	Pontchartrain Basin Fly Fishers	LA
102	Red Stick Fly Fishers	LA
103	S. W. Louisiana Fishing Club	LA
104	Bass Anglers Alliance	MA
105	Blackstone Valley Bass Anglers	MA
106	Boston Bass Anglers	MA
107	Buzzards Bay Anglers Club	MA
108	Cabin Fever Bass Club	MA
109	Cape Cod Bass	MA
110	Cape Cod Fishing n Surfcasting	MA
111	Captain Bub's Bass Trail	MA
112	Chelmsford Bass Tacklers	MA
113	Forge Pond Bassmasters	MA
114	Mass Bass Buddies	MA
115	Massachusetts Striped Bass Association	MA
116	Massmasters	MA
117	Nipmuck BassBusters	MA
118	Northern Bass Assoc.	MA
119	Osterville Anglers Club	MA
120	Plum Island Surfcasters	MA
121	R.I. Castaway Bass Anglers	MA
122	South Shore Bassmasters	MA
123	Tri-Valley Bassmasters	MA
124	Worcester Bassmasters	MA
125	Worcester County Bassers	MA

126	Bassin Bunch Bass Club	MD
127	Big Dawg Bassmasters	MD
128	Champions Choice Bassmasters	MD
129	Deep Run Bass Club	MD
130	Fish On Bass Anglers	MD
131	Kickn' Bass Anglers	MD
132	Outlaw Bassmasters	MD
133	Renegade Bassmasters of Maryland	MD
134	Androscoggin Bassmasters	ME
135	Bangor Bass Club	ME
136	Central Maine Bassmaster	ME
137	Central Maine Bassmasters	ME
138	Maine Country Bassers	ME
139	Millennium Bassmasters of Maine	ME
140	Northeast Bassmasters	ME
141	Northern Aroostook Bass Anglers	ME
142	Penobscot Fly Fishers	ME
143	Rocky Hill Bass Anglers	ME
144	TBF of Maine (The Bass Federation)	ME
145	The Fall Guys	ME
146	The Maine Blade Runners	ME
147	Bass Anglers of the Sunrise Side	MI
148	Clinton Valley Chapter of TU	MI
149	Downriver Bass Association	MI
150	Flygirls of Michigan	MI
151	Laingsburg Bass Fishing Club	MI
152	Michigan Fly Fishing Club	MI
153	Duluth Bass Club	MN
154	Gopher Bassmaster	MN
155	Muskies Inc - Twin Cities Chapter	MN
156	Sportsmen Bassmaster	MN
157	West Central Bassmaster	MN
158	American Casting Association	MO
159	Aurora Backlashers Bass Club	MO
160	Pomme de Terre Chapter of Muskies Inc.	MO
161	Superbass Tournament Trail	MO
162	Beginners Choice Bass Club	MS
163	Magnolia Crappie Club	MS
164	Montana Bass	MT
165	The Bass Federation of Montana, Inc.	MT
166	Carolina Fly Fishing Club	NC
167	Carolina Lady Anglers	NC
168	Catfish Anglers Association	NC

169	Cheat Lake Angler's Bass Club	NC
170	East Cooper Fishing Club	NC
171	Elizabeth City Bass Master	NC
172	Fairfield Harbor Fishing Club	NC
173	Johnston County Fishing Club	NC
174	Leesville Bass Masters	NC
175	Badlands Bass Bandits	ND
176	Asbury Park Fishing Club	NJ
177	Atlantic Saltwater Flyrodders	NJ
178	Beach Haven Marlin and Tuna Club	NJ
179	Berkeley Striper Club	NJ
180	Fish Hawks Saltwater Anglers	NJ
181	Hi-Mar Striper Club	NJ
182	Jackson Bass Anglers Association	NJ
183	Jersey Coast Shark Anglers	NJ
184	Jersey Shore Surfcasters	NJ
185	Las Vegas Woods and Waters Club	NV
186	Al Hazzard TU	NY
187	Art Flick Trout Unlimited	NY
188	Atlantis Anglers Association	NY
189	Bayside Anglers	NY
190	Black Rock Bass Busters	NY
191	Canandaigua Lake Trout Unlimited	NY
192	Catskill Mountains TU	NY
193	Freeport Tuna Club	NY
194	Juliana's Anglers Sporting Club	NY
195	Kayak Fishing Association of New York	NY
196	Long Island Flyrodders	NY
197	Salty Flyrodders of New York	NY
198	Seth Green TU Chapter	NY
199	Squaw Island Fishing Club	NY
200	The Lady Reelers of Long Island	NY
201	Theodore Gordon Flyfishers	NY
202	Traditional Surfcasters	NY
203	Trout Unlimited Iroquois Chapter	NY
204	Twin Tiers Five Rivers FFI	NY
205	Western New York TU	NY
206	Briarwood Sporting Club	OH
207	Buckeye Fly Fishers	OH
208	Buckeye United Fly Fishers	OH
209	Butler County Bassmasters	OH
210	East Fork Bass Anglers	OH
211	Land of Legend Fly Fishers Club	OH

212	Waterscape Fishing Club	OH
213	Oklahoma Trout Unlimited & Tulsa Fly Fishers	OK
214	Cascade Family Flyfishers	OR
215	Clackamas FlyFishers	OR
216	Rogue Flyfishers	OR
217	Santiam Flycasters	OR
218	Stonefly Maidens Fly Fishing Club	OR
219	Alpine Hunting and Fishing Club	PA
220	Centre County Bassmasters	PA
221	Harrisburg Hunters and Anglers	PA
222	Lunker Hunters	PA
223	Middletown Anglers & Hunters Club	PA
224	Montgomery County Anglers Fishing Club	PA
225	Northeast Panfish League	PA
226	Oley Valley Fish and Game Association	PA
227	The Delaware River Fishermen's Association	PA
228	The Forrest Lake Club	PA
229	Aquidneck Island Striper Team	RI
230	Bassbums	RI
231	Coventry Bass Anglers	RI
232	East Bay Bassmasters	RI
233	Eastern Flyrodders	RI
234	Narrangansett Salt Water Fishing Club	RI
235	Rhode Island Mobile Sport Fishermen Club	RI
236	Team Rhode Island Bassmasters	RI
237	The Rhode Island Saltwater Anglers Associations	RI
238	American Bass Anglers	TN
239	Harrison Bassmasters	TN
240	Monroe County Bassmasters	TN
241	Straight-Up Bass Club	TN
242	Arlington Bass Club	TX
243	Austin Fly Fishers	TX
244	Bass Club of North Texas	TX
245	Cast-a-way Bass Club	TX
246	Housatonic Fly Fisherman’s Association	TX
247	Houston Oilman's Bass Club	TX
248	Mid cities of anglers	TX
249	Quality Bass Club of San Antonio, TX	TX
250	Saltwater Anglers League of Texas	TX
251	The Colony Bass Club	TX
252	The Stonefly Society	UT
253	UTBASS Tournament Circuit	UT
254	Augusta County Bass Jon's	VA

255	Falmouth Flats Fly Fishers	VA
256	Norfolk Anglers Club	VA
257	Old Dominion Catfish Club	VA
258	Virginia Anglers Club	VA
259	Chittenden County Bassmasters	VT
260	Clark-Skamania Flyfishers	WA
261	Fishing Coaches	WA
262	Mountain Muskies Chapter 60	WA
263	NW Tiger Pac, Chapter 57, Muskies	WA
264	Spokane Women on the Fly	WA
265	God's Country Muskies Inc	WI
266	Lunkers Unlimited	WI
267	River Falls, WI Kinni Bass Master Fishing Club	WI
268	Walleyes Unlimited	WI
269	WIFA	WI
270	Wisconsin Fishing Club Ltd	WI
271	Wisconsin Smallmouth Alliance	WI
272	Wisconsin Women’s Fishing Club	WI
273	Yahara Fishing Club	WI
274	Big Bend Bassmasters	WV
275	West Virginia BASS Federation	WV
276	West Virginia Kayak Anglers	WV
277	Wyoming Fly Casters	WY

Nantucket Interviews:

Tara Riley, shellfish biologist
Jeff Carlson, coordinator for marine resources for Nantucket

11/6/17 9:50 - 10:50 a.m.

- Fishermen don't necessarily agree on things. "If you ask 50 fishermen what time it is, you'll get 50 different answers." -Jeff Carlson
- Government moves slowly, so have "enough people who are interested and excited about it to keep the momentum going." - Tara
    - The process is also slow because the department is small with only 6 people employed full time. In addition, small communities often run out of volunteers since they burn out quickly.
- If the department is trying something new, try to capture the ideas of the younger fishermen.
    - Before making official statements, get the support of some fishermen, or gather some ideas directly from the fishermen.
- It is impossible to constantly monitor and check everybody. The better way is to try to keep the honest people honest and catch the dishonest ones.
    - It helps to know the fishermen personally, so they'll feel more comfortable around the department and be more willing to sharing information to ultimately work on improving the biological program.
    - "If you see something and you're worried about it, be comfortable enough to let us know" -Jeff
    - Keep enforcement separate from biology. Otherwise, public relationship gets messy.
    - Tara came to the hatchery in 2009 and it was a "hostile environment" with the fishermen. However, hearing what they say and making sure that they are informed before making any statements has helped further improve relations.
- When determining habitat destruction and overfishing, the best way to find out is to cross as many causes and impacts off as you can.
    - "You have to be able to control and remove what you can… everything has to be on the table, nothing is sacred." -Jeff
    - Variable need to be tested and removed. It is largely based on trial and error.
    - There is no magic solution.
- Keep license fees affordable and transparent for the public.
    - When anyone purchases a recreational or commercial license, 75% of the fees goes back directly to the shellfish propagation or management within the department.
- Community outreach is an important part for their relationship with the public.
    - Social media platforms such as Facebook, Twitter, and Instagram all help increase awareness. The department is still getting adjusted to using the technology though.
    - Town meetings are also very important for in person initiatives.

- One of the department's latest successes has been their mentorship program. It was established in 2008 and met with initial skepticism but has since turned out to be successful.
    - If there is a new entry for a commercial bay scalloper, the new entry must spend 40 days as an apprentice with an older, more experience scalloper.
    - It allows the veterans to pass down their knowledge and provide the new scallopers with valuable water experience.
    - "They know the unwritten rules of the road… that they want to pass on" -Jeff
- There are a few lobbyist groups: Nantucket Shellfish Association, Nantucket Land Council, and local homeowners associations.
    - The department receives a lot of support since the community understands what the department is doing and want to participate since they enjoy spending time outside.
    - Approximately ⅔ of the island is managed by groups that refuse to any development to happen on it.
- The limit on dredge weights and other regulations have improved the environment and habitat for scallops.
    - There are actions now on new ways to moor boats and to protect to the eelgrass as much as possible.

Dan Drake
President of Nantucket Shellfish Association (NSA)

11/6/17 3:00 - 3:50 p.m.

- He founded the NSA in 2002 and it became incorporated in 2003. The NSA was formed as a result of no scallop regulations being in place and worsening fishing conditions.
    - In 2002, there was tension between the scallopers and the marine department.
    - In 2004, Dan and Rod Garris (who was the head of the department at the time) developed a plan to develop the hatchery.
    - This year (2017) is the first full year the hatchery has been in operation. Tara Riley was hired in 2009 and stirred people into action.
- Conflicts have arisen in the past between Nantucket government and fishermen, specifically with poor enforcement officers and over-monitoring
- Government can be effective, but they need someone to prod them along: "[Fisheries departments are] not an essential government service… more of an add-on."
- Recreational fishermen are almost all "rugged individuals" – some have college degrees, but won't connect to any online presence unless their values are threatened and action is needed.
- Nantucket Shellfishing Association's primary purpose is to "make sure the town knows that there's somebody… talking out for the fishermen."
    - The NSA work with the public and the government as a go-between.
    - They are an all-volunteer organization with around 300 members and run on a budget of $100,000 per year.
- Fishermen have disagreements on why the current fishing regulations are in place.
    - Generally, many fishermen feel most of the regulations are based in science, but feel that there not enough scientific research to fully trust the decisions and limits.
    - Nantucket have felt that it's unclear if the regulations have produced positive results, and feels more like trial and error and "shots in the dark."
- Drake's best advice is for "everybody... to make an effort to work together."
    - "It's too easy" for organizations to just work on their own with their own views.

Massachusetts Division of Fisheries and Wildlife Interview

Michael Armstrong

12/1/17 10:30 - 11:30 a.m.

- Their fishing license program was created about 8 years ago in response to government mandates for a license program, as well as an NSF review wanting a database of anglers.
- Initially, they had trouble and even tried to create a program in 1996, but were met with protesters.
- Price started at $10, below the median state price of $15 for an annual license, to "make it more palatable".
    - There is a small processing fee from the Active Outdoors Network. However, some older fisherman still just drive to the office to save that dollar and change.
- The state law sets the license while the Administration and Finance department sets the standards for price, and DFW set the price, which gets approved by the governor.
- License sales generate about $1.2 million annually. About a third is set aside dedicated to public access such as management of piers and the purchasing of land for fishing use
- They keep it simple with license lengths and prices.
- Since the program was instituted, there has been about 3% of growth every year here so far.
- Other states charge more, and Massachusetts may want to raise their prices someday
    - A vast majority of their anglers come from other states such as Connective and Rhode Island
    - About 30,000 fishermen are out of state and there are a total of 100,000 fishermen.
- They created a panel of people that helped create the license and helps maintain and monitor funds
- Obtaining catch data is vastly easier with recreational fishing license program.
- They used to send staff out to ask fishermen and conducted self-reporting surveys
    - They moved from phone surveys which were ineffective to paper surveys where the recipient gets a dollar if they take it and is effective.
- "Managing a fishery is like managing a forest, except it's always night and the trees move".
- Surveys always have error bias, and can be hard to use for fisheries management.
    - It is hard to tell when fish yield is over the limits or under but sometimes it's the only data fisheries management has.
- They work with the Active Outdoors Network to help with data and online licenses.
    - They have noted that it is their customer service is difficult to work with.
    - They're all right but are very slow to manage.
- It is hard to communicate with public at large since about 90% of the recreational fishing community is comprised of casual anglers.
    - They have fishermen's mails, but they can not get more information than that due to state law.
    - "We want an email from everyone… [but] can't require it by state law."

    - Since a majority of license are sold at retail outlets, those stores don't give the basic protocol outline which leads to customers not putting their email down.
    - They can't administer licenses directly from their department: contracted by Active Outdoors.
- One current action that depends on communicating with the public is trying to promote circle hooks with their manufacturers.
    - More bass are killed by J hooks than catch and release. Approximately 360,00 fish die every year with hooks compared to the 200,000 fish that are actually pulled for harvest.
- People want to know the truth and it's better to always be upfront with the public to help maintain transparency and relationship.
    - By involving the citizens, community, the panel, it all helps to "get the word out".
- Positive environmental benefits include seeing the river herring come back due to efforted and using funds to help improve their habitat.
- They have a saltwater anglers education program
    - The program is still in infancy.
    - Normally, they have camps 6 times a year. that are always full with 35 children up
    - However, funding and staff are limited with one halftime dedicated staff member
- In creating the program, the program gave talks to fishing groups but still they can't really reach the casual anglers.
    - In the past, they have relied on their panel that consists of approximately 25 people to get the word out.
    - However, the panel is limited in its ability and they couldn't really talk to legislators without permission.
- Massachusetts just finished building their first artificial reef.
    - "We already have rocks"
    - The reef was placed in Harwich with tremendous success and plenty of black bass.
    - However, it was expensive and a myriad of materials were needed to build the reef.
    - They learned it was oriented wrong: north south as opposed to south west to north east with the winds.
- Advice: "You need to involve the citizens… tackle shop owners, sportfishing clubs."
- Workers are unionized so they cannot get fired.

Rhode Island Department of Environmental Management Interview

John Lake

11/31/17 10:30 - 11:30 am

- They have bi-annual coast wide meetings to get different ideas and see how different programs are doing.
- All regulations are under general law within the government and to edit any regulations requires going through the government.
- Having an active and strong relationship with saltwater angler organizations helps manage the recreational fishing license program.
    - When they were making the program (about 7 years ago) they took a lot of the anglers suggestions into consideration.
    - Tackle shops were also involved.
- First time they tried to get in through the legislature it got vetoed out.
    - Public support was vital towards passing regulations.
- Every dollar made from license fees goes back towards to program.
- They created a council/task force.
- Online sales have 2 models.
    - Set a fee then add on an additional convenience fee.
    - Fee is the fee (this is Rhode Island's approach).
    - Get $4 out of $7 back from fees.
    - Every dollar made gets doubled or tripled by Dingle Johnson grant/USFWS
- However, now when someone buys a license in person, the access fee will be charged because of attempts to better incorporate technology and law together.
    - Want the system and internet to be associated with one another now and just to "do it all at once".
- It's important to have accountability, recommendations, and involved relations with the public.
- A majority of funds go towards improving water access with building or renovating boat ramps and piers.
    - Also, it is an incentive of moving RI's fishing industry from a commercial mindset to a more recreational focused one.
- They have a biologist strictly there to gather data who is not an enforcer.
    - Helps ease public relations since there is no combined jobs.
    - Helps get out of the commercial fishing "box".
- They have money from fees go into a restricted receipt account instead of the state's general fund.
    - It's more like a savings account.
    - If it goes to general fund, they would never see the money again.
- Advertising and branding was not effective for their recreational fishing license program.
- The have created an outreach program to address the aging demographic and bring new fishermen into the industry.
    - They have a magazine that is both academic and entertaining about fishing.
- Freshwater fishing has higher maintenance costs due to hatcheries and stocking.

- Rhode Island wanted an all combination license "all outdoors license" to make everything simpler and easier for everyone.
- Aquatic Resources Education Program is self-serving and uses license funds but gets younger people involved and better reaches the demographic who only fishes once or twice a year.
    - Program not just used to make money.
- Helpful notes for Puerto Rico:
    - Consider the reciprocity rule with gulf and Florida licenses
    - Consider disabled licenses
    - If they have over X years in age free license, make them fill out the form every year to still collect data.
- Commercial fishing and fishing in general is going down because of the "aging fleet".
    - Average age is over 50 years old now.
    - To help combat this there are exit/entrance ratios, mentoring programs, and education programs.
- They are testing the commercial licenses by increasing the fees next year.
- Process of how to edit regulations that are under general law
    - Make the bill
        - Justify every point, what to do with profits and fees, what and how money will be used for
    - The program needs money to leverage the other money (basically how to handle advanced cash)
    - Then it goes to legislature at at vote
        - Needs a sponsor or a "champion" to really pass though
    - A very political process
- Reciprocity laws are when one fishing license for a specific state can be used in other states.
    - Florida would never agree to that since they want tourists coming to their state to fish.
    - People find loopholes in the regulations to get around.

Initial Phone Interview Prompt:

Introduction (name, I'm on a student project team at WPI in Worcester, MA.)

We have been working with the DNER in Puerto Rico to create a business plan to help implement a recreational fishing license program. We were going to fly down to the island to help with the project, but the hurricanes did not allow us to travel. Instead, our group's new goal is to create a recommendations report about structuring license fees to help the DNER help update their prices. We are hoping to combine the views of government organizations and recreational fisherman in our final report.

And we were hoping to talk to your agency to discuss matters relating to your license fee structure. Can we arrange to hold a phone interview, a skype interview, or email questions we have, to either with you or someone who can provide us answers to our questions?

Final questions to ask organizations over the phone or in person

The Actual Process of Pricing

How do you determine the price of the recreational fishing license?

How do you determine the distribution of the profit gathered from the sale of the recreational fishing license?

What type of fishermen do you try to attract to fish in your local waters? Do you try to attract: tourists, locals, older, younger people?

Environmental Benefits from the Distribution of Recreational Fishing License Funds

What tangible environmental impacts have come as a result of the recreational fishing licenses program funds? Can you give us specific examples of programs or projects the fees have gone to?

Transparency and Relation with The Public

Do you let the public know of where the money goes? If so, why do you do so?

Has the agency tried to build a trusting relationship with the public? If so, how was that accomplished?

How does the public react to the changes in the recreational fishing license program? If so, what changes did they react to? Were they price related?

Challenges with the License Program

What are the long-term challenges that come with managing the recreational fishing license program?

What are the day-to-day challenges that come with managing the recreational fishing license program?

Additional **State Specific Phone or Email Interview Questions**

Alabama

On your document you said you used the Consumer Price Index for Consumers to increase license fees.

Are there any other factors you use to determine this price increase? Why was this regulation implemented? What have been public reactions to this legislation?

How much have prices increased with this regulation? Are there more increases coming up in the future?

You stated that your revenue will be used for: construction, maintenance, development, and supervision of public fishing lakes, for the purchase of lands to be used for public landings on public streams and for the development, protection, propagation, and distribution of fish and wildlife of this state.

What "development, protection, propagation, and distribution" techniques do you use and how does the revenue generated by licenses help carry this out

You say that the revenue is used for maintenance and supervision of lake, what specific actions do you take to do this?

Alaska

Has a lot of stuff with updated prices this year (2017), last time they updated was 20 years ago, lots of people were on board with it too. The Alaska Department of Fish and Game maintains active and comprehensive management and research programs to ensure fish and wildlife populations are "utilized, developed, and maintained on the sustained yield principle," in accordance with Alaska's Constitution.

Can you go into detail with specific programs and some notable progress a few of them have accomplished?

Arizona

On your website we found that in 2007, you increased the prices of your licenses.

You set a date for public input on the fee increase. What were the responses to this like?

With this fee increase you said that:

You would invest in improving fishing opportunities and quality for Arizona anglers. Activities would include necessary hatchery improvements would be used to acquire, grow and stock fish, and for angler recruitment programs.

Could you give us specific examples of how you improved fishing opportunities?

You would attempt to resolve access issues to public land that is accessed through private land is a major focus of the department. The department will continue to work with landowners to negotiate easement agreements to assist with wildlife management and to provide access for anglers.

Could you give us specific examples of how you resolved access issues?

You would invest money in support of local sportsmen's-and-women's clubs to support youth programs and hunter recruitment efforts. Investments may take the form of direct support, expansion of sponsored youth events, or support for club involvement in the Scholastic Clay Target and Archery in the Schools programs.

Could you give us specific examples programs you invested in?

You would work with public and private landowners, and at state-owned wildlife areas, to improve habitat for wildlife. Examples include water developments, habitat improvement projects to help deer populations, and habitat treatments on public lands.

Could you give us any specific examples of how you improved water habitats?

You would improvement customer service which would include hardware and database support for law enforcement, additional field officers, and facilities repairs and improvements necessary to support field operations in regional offices and rural areas. The goal: greater officer field presence and facility efficiency.

Could you give us any specific examples of how you went about this?

What percentage of money is distributed to different initiatives every year? Is it a fixed amount per initiative or does it change year by year with specific needs in the environment?

California

The fees for fishing licenses, operated by the California Department of Fish and Game, are used for research, outreach programs and protection of California's diverse and important ecosystems. What specific examples of how the license fees are used can you give us?

You publish that you use the implicit price deflator and that most fees include 5% license agent handling fee and 3% nonrefundable application fee. What other factors play into the pricing of the licenses?

Why did you publish this information online? Do you think people read it?

Connecticut

Under your CARE (CT Aquatic Resources Education) program,

What positive social, economic, or environmental impacts have you seen arise from this?

Delaware

Under state and federal law, all fishing license revenue must be dedicated to the Division of Fish and Wildlife for fishing-related projects and cannot be diverted for other uses. The new law also establishes the Council on Recreational Fishing Funding, with seven voting members to be appointed by the Governor to advise the Division on expenditure of recreational fishing license funds generated.

What specific fishing related projects have the funds gone towards?

How helpful has the council been with fund allocation? Who are the members, fishermen, politicians, etc?

Florida

How else besides the tax collector ($1.00) or agent ($0.50), and processing surcharges listed above, how is the price of the license determined?

It is stated that all of the money spent on fishing and licenses goes to the Florida Fish and Wildlife Conservation Commission (FWC) to provide optimum sustained use of Florida's fish and wildlife resources.

Do you find it useful to use an outside organization to properly distribute the money made by the license?

What initiatives have they contributed too as a result of the recreational fishing license?

Georgia

Back in April, you raised the price of the license.

What was the public reaction to this seeing that it was the first rise in price since 1992?

What would you suggest another organization instituting a recreational fishing license fee should do?

Have you been able to hire the proper number of wardens?

Do you plan to use the money for just that, or for other initiatives?

Idaho

The Idaho Fish and Game Commission directed Fish and Game staff to develop a proposed bill for consideration by the Idaho Legislature that would create a new $5 charge to purchase an Adult Resident annual hunting, fishing or trapping license.

What spurred you to add this $5 charge to additional license costs? What have been the public's reactions to this? It said that fishing access would be improved, how specifically will this fee help with that? (Can you elaborate)

Maine

In 2016, your license prices had an additional $2 agent fee.

What is the fee used for?

Every 4 years, hunting and fishing licenses should be reviewed by the legislature and adjusted as appropriate to reflect the cost of providing hunting and fishing related services.

When was the last time license fees were adjusted and by how much?

Maryland

You have a very transparent and open policy towards providing information for the public

Why and when has your government placed such an effort into public awareness? What positive economic, social, or environmental impacts have you seen arise from this?

Massachusetts

You state that in 2010 a recreational angler needed to sign up for the National Saltwalter Angler Registry and pay those additional fees. However, NSAR no longer is applicable to MA waters.

Why is NSAR no longer applicable? What has been the public reaction to this? Has this made the purchasing process of licenses easier or harder, why?

You use part of your revenue from licenses to develop the Saltwater Angler Education Program

How long has this program been established for and what positive impacts have you seen arise from it?

As of Feb. 17,2011, MA has reciprocity agreements with NH, RI, CT, and ME.

How did these agreements come about and why? What positive impacts have you seen occur regarding the environment and participation? Are there any drawbacks?

Michigan

You state that revenue generated from these funds will be used to educate the public on the benefits of hunting, fishing and trapping in Michigan, and the impact of

these activities on the conservation, preservation and management of the state's natural resources.

What examples of educational programs have been instituted as a result of the recreational fishing license fees? Have you seen any benefit from these?

Do you use any of the funds directly on improving the water environment?

New Hampshire

Do you think that the public reads the information that you post online about pricing changes?

Rhode Island

license fee revenues can only be used to administer and enforce the license program, improve the management of RI's marine recreational fisheries (developing more accurate assessments of recreational catch and effort, and enhance recreational fishing access opportunities in the State. The license fee revenues cannot be used for any purpose that is unrelated to marine recreational fishing in RI)

What specifically (programs, regulations, etc.) has your revenue been used for? How receptive is the public towards this?

Wisconsin

Your fishing license purchase helps to protect and preserve the sport of fishing for years to come. The fees collected from Wisconsin fishing licenses go toward fishery management, habitat development, endangered species programs, and conservation education. What specific examples of programs have been funded by the license fees?

Wyoming

Wyoming Game and Fish gets 55 percent of its budget from fishing and hunting license sales.

What aspects of the budget do fishing license sales explicitly play in?

Arkansas Interview

The Actual Process of Pricing

How do you determine the price of the recreational fishing licenses?

The Arkansas Legislature sets all fishing and hunting license prices. Our agency has only minimal say.

How do you distribute profits from the recreational fishing license sales?

Fishing license sales proceeds go into the agency's general fund, which can be used for anything the agency does. There is no dedication of these funds for specific purposes, with two exceptions. A $2 increase in non-resident trout stamps is earmarked for our trout habitat program, and a recent increase in non-resident hunting and fishing licenses is earmarked for replacing capital (> $5,000) equipment for the agency.

What type of fishermen do you try to attract to fish in your local waters? Do you try to attract: tourists, locals, older, younger people?

We try to provide opportunities for each of the groups you listed and others. We have begun to attempt to look at our fishing access program in a holistic manner, where we make sure we are providing opportunities for very avid anglers who require fewer amenities, other types of opportunities for older people or families who may be more attracted to facilities with easier access and maybe enhanced facilities (e.g. restrooms), other opportunities for those who want to escape the crowds, and still other opportunities for tourists who may have unique needs. We need to do a better job of marketing these opportunities, but the answer to your question is all of the above and more.

Is the Arkansas recreational fishing license economically successful?

I'm not sure how to interpret this question, but our fishing license is a bargain, and our fishing industry provides a major economic impact for our state and creates a lot of jobs in the service and tourism sectors. In terms of funding our agency, we haven't had a fishing license price increase since the early 1990's, and so our license revenue has not kept up with inflation. However, our agency is one of the few that has a dedicated funding source from a 1/8 of 1% "conservation sales tax." We receive 45% of the revenue from that tax. So, politicians are not inclined to raise our license prices because we receive tax proceeds.

Environmental Benefits from the Distribution of Recreational Fishing License Funds

What tangible environmental impacts have come as a result of the recreational fishing licenses program funds? Can you give us specific examples of programs or successful projects the fees have gone to?

It's hard to tie any specific projects that we do to any specific funding source. However, many of the projects we do are 75% funded by Federal Aid in Sportfish Restoration Funds, and we likely use most of the license funds to cover the other 25% of the cost of these projects. A good, specific example of this has been the improvement of instream habitat in our trout tailwaters. Another example is where we have used some of these funds to pay for notching of dikes on the Arkansas River to improve fish habitat.

Transparency and Relation With The Public

Do you let the public know of where the recreational fishing license fees go towards? If so, why do you do so?

We try to let the public know how their license fees are used. We don't always do a great job. We tend to promote the use of our conservation sales tax funds and our Federal Aid in Sportfish Restoration funds much more. We definitely want the public to know how their money is being used to help build their trust in our agency and for them to be advocates for us in the political realm.

Has the agency tried to build a trusting relationship with the public? If so, how was that accomplished?

We have tried. We use many means of communication with the public. We solicit public input for all regulation changes via online surveys. We often hold public meetings around the state for especially contentious issues. We make all of our data and reports available to the public in the interest of transparency and education. We are a very visible agency in our state compared to most fish and wildlife agencies that I am familiar with.

How does the public react to the changes in the recreational fishing license program? If so, what changes did they react to? Were they price related complaints?

The public in our state hasn't had to deal with any changes in license prices. We did just change our license vendor and went to a pdf license that can be printed out or saved on a smart phone. We previously had the heavy, "smooth" paper licenses that the vendor printed for the customer. This change has been met with a great deal of resistance and complaining. It's hard to give a specific reason other than people just don't like change.

Challenges with the License Program

What are the long term challenges that come with managing the recreational fishing license program?

Our license database includes a lot of inaccurate information. We recently conducted a mail survey of a sample of 10,000 recreational fishing license holders, and 25% of the surveys were returned undeliverable. We also lack email addresses for most of our license holders, and we have not been collecting demographic information other than gender for the past 10 years or so. These factors all make communicating with our customers and understanding who our customers are more difficult. It's hard to cater to their wants/needs if we have no way to reach 25% of them.

What are the day-to-day challenges that come with managing the recreational fishing license program?

Right now it is just about managing the customer experience with our change in license vendors. Hunting license issues are much more difficult than fishing due to the high number of permits and tags that are used for various types of hunting. With fishing in Arkansas, it's pretty simple, we have licenses and trout stamps, and that is all from a recreational standpoint.

Additional Questions

Many state agencies have different lengths of multi day recreational fishing licenses. In Arkansas, the options for these multi day recreational fishing licenses are 1,

3, and 7 days in length. Why were these intervals of times chosen over other intervals of time?

These were likely chosen because a neighboring state had them and/or someone asked for them. I don't know the history, but I highly doubt there was any strategy involved in picking them.

Why does the trout fishing license have to be purchased alongside with a normal fishing license (both resident and nonresident) to fish in certain areas?

There is only one naturally reproducing trout population in our state, and even those were introduced by stocking. Trout are not native to Arkansas, and all populations are maintained via a major stocking operation that consists of one state-owned hatchery and 2 federal mitigation hatcheries. Trout stamp funds are primarily used to support stocking from the state facility, a trout management program that monitors populations and works with stakeholders, and the aforementioned trout habitat program that works to improve instream habitat in trout tailwaters.

Florida Interview
The Actual Process of Pricing
How do you determine the price of the recreational fishing licenses?

Fishing and hunting licenses and fees were established after careful deliberation by Florida's Legislative body with everyone's best interest in mind.

How do you distribute profits from the recreational fishing license sales?

Revenues from recreational license and permit sales are used to support fish and wildlife research, management and law enforcement pursuant to Florida Statutes.

What type of fishermen do you try to attract to fish in your local waters? Do you try to attract: tourists, locals, older, younger people?

All of the above.

Is the Florida recreational fishing license program economically successful?

Each license holder that buys a license, helps the FWC to recover excise taxes from the Federal government, assessed on items such as fishing tackle, boats, and for motor boat fuel taxes, through the Federal Aid in Sportfish Restoration program.

Environmental Benefits from the Distribution of Recreational Fishing License Funds
What tangible environmental impacts have come as a result of the recreational fishing licenses program funds? Can you give us specific examples of programs or successful projects the fees have gone to?

Marine Fisheries Research – To assess and predict marine fishery population trends, the Marine Fisheries Research section collects and integrates biological and harvest information from commercial and recreational marine fisheries and invertebrate species. This section plays a major role in the Florida Marine Fisheries Enhancement Initiative – the FWC's cooperative effort to expand marine stock enhancement statewide. This section also provides nearly all biological information, expert assessments and analyses used by the FWC, interstate commissions and federal councils charged with managing Florida's marine fisheries resources.

Division of Marine Fisheries Management sections - Analysis and Rulemaking - This section compiles fishery data, coordinates with other government agencies and research institutions, and solicits information from the public regarding fishery management strategies for state saltwater fisheries regulations. Section employees use this information to develop management and rule-making recommendations for Commission consideration.

FWC officers and investigators enforce laws to protect the resources of Florida and the safety of people using these resources when freshwater and saltwater fishing.

Transparency and Relation With The Public
Do you let the public know of where the recreational fishing license fees go towards? If so, why do you do so?

Yes, fee disposition and uses are specified by the Florida Legislature in Florida Statutes and assures the public the money spent on fishing licenses goes to the Florida Fish and Wildlife Conservation Commission (FWC) to provide optimum sustained use of Florida's fish and wildlife resources.

Has the agency tried to build a trusting relationship with the public? If so, how was that accomplished?

The commission has moved the decision-making process closer to the people, expects each FWC employee to be an ambassador for FWC and its mission when interacting with Florida's diverse residents and visitors and provides efficient and effective service to Florida's diverse residents and visitors.

How does the public react to the changes in the recreational fishing license program? If so, what changes did they react to? Were they price related complaints?

The last time fees were increased by the Florida Legislature, the public was supportive due to assurances that the fees would be used as stated above.

Challenges with the License Program
What are the long term challenges that come with managing the recreational fishing license program?

Recruitment of new anglers, Retention of anglers and Reactivation of Licenses. Baby boomers are aging out. Changing demographics and need to appeal to a more diverse population.

What are the day-to-day challenges that come with managing gthe recreational fishing license program?

Continuously changing technology. Increasing need for technically skilled employees to administer online license system.

Additional Questions
Why do you make the youth license fees optional?

Pursuant to Florida Statutes, youth under the age of 16 are not required to purchase a license.

Many state agencies have different lengths of multi day recreational fishing licenses. In Florida, the options for these multi day recreational fishing licenses are 3 and 7 days in length. Why were these intervals of times chosen over other intervals of time?

This would cover a weekend or week-long vacation stay.

What was the reasoning behind choosing a 5-year recreational fishing license option over other lengths of multiyear licenses?

Customer's did not want to have to renew their license each year. Increases retention.

Since we are trying to help Puerto Rico in the aftermath of Hurricane Maria, how much did the recreational fishing participation change after major hurricanes hit the coast of Florida?

Storm events cause a temporary disruption in license sales, but sales generally rebound rather quickly once the event has passed.

Michigan Interview

The Actual Process of Pricing

How do you determine the price of the recreational fishing licenses? The Michigan legislature is responsible for setting the price of fishing licenses.

How do you distribute profits from the recreational fishing license sales? Fishing license dollars fund a variety of activities including; fish management work on the state's waters, habitat rehabilitation and protection, fish stocking, information distribution, education and outreach efforts to anglers and the public, and much more. The Michigan Department of Natural Resources' Fisheries Division receives almost no general fund tax dollars to support its activities. Instead, Fisheries Division depends heavily on angler dollars collected through fishing license sales and federal excise tax dollars from the sale of fishing tackle (Dingell-Johnson Sport Fish Restoration Act) to manage Michigan's fisheries. Buying a fishing license, even if you do not plan to go fishing, can make a big difference to the future health of Michigan's prized freshwaters.

What type of fishermen do you try to attract to fish in your local waters? Do you try to attract: tourists, locals, older, younger people? We try to attract many types of people to Michigan waters. Michigan is a world class fishery so we market to non-resident anglers as well as a variety of strategies for residents. We target young and inexperienced anglers through programs like hook, line and sinker. Female anglers are also a rapidly growing group that we market too. In addition we employ retention and reactivation marketing techniques to the recreational angler audience in general.

Is the Michigan recreational fishing license economically successful? Yes,

- Anglers boost the state's economy, spending $2.4 billion in trip-related expenses and equipment in 2011.
- Michigan's angler participation rated fifth in the nation — 1.1 million licensed anglers in 2011 - drawing over $11.2 million in federal funds to fish and aquatic habitat conservation

Environmental Benefits from the Distribution of Recreational Fishing License Funds

What tangible environmental impacts have come as a result of the recreational fishing licenses program funds? Can you give us specific examples of programs or successful projects the fees have gone to?

The link below lists 6 projects regarding grand funds for dam repair or removal. Details regarding the fish, wildlife and public safety benefits are outlined on this page.

Transparency and Relation With The Public

Do you let the public know of where the recreational fishing license fees go towards? If so, why do you do so?
We do communicate what license fees are generated for regarding conservation and highlight key projects. We do so for transparency as well as to inform the public of the incredible value of a license purchase provides.

Has the agency tried to build a trusting relationship with the public? If so, how was that accomplished? The agency is continually building trust with the public. The Michigan DNR is dedicated to engaging with the public through a variety of ways including a division devoted to marketing and outreach. Through the division, the department reaches the public through classroom programs, interpreter/educators, various communications including active social media, local and regional meetings and public opinion surveys just to name a few.

From your website, we found: “As of March 1, 2014, the price and structure of fishing licenses have changed. The current structure creates a simpler, more fair and efficient license buying process. All fishing licenses are “all species” licenses. There is no longer a restricted license type. A $1 surcharge is added to the combination hunt and

fish licenses, resident annual, nonresident annual, and resident senior annual all-species fishing licenses, as noted with the asterisk (*). Revenue generated from these funds will be used to educate the public on the benefits of hunting, fishing and trapping in Michigan, and the impact of these activities on the conservation, preservation and management of the state's natural resources in accordance with statute." How did the public react to this change? Some members of the public expressed concern over the price increase while others expressed support knowing that the funds go to the work mentioned in the above statement. The public continued to view the license fee as valuable as they continued to purchase fishing licenses at a slightly less but similar rate as prior to the fee change.

Challenges with the License Program

What are the long-term challenges that come with managing the recreational fishing license program? Balancing the needs of a diverse group of users in an efficient, effective and cost effective way in a rapidly changing social environment.

What are the day-to-day challenges that come with managing the recreational fishing license program? Same as long term

Additional Questions

Many state agencies have different lengths of multi day recreational fishing licenses. In Michigan, the options for these multi day recreational fishing licenses are 1 and 3 days in length. Why were these intervals of times chosen over other intervals of time? The one and three day licenses are predominantly geared toward the non-resident vacation angler. The intervals were chosen around flexibly of the amount of fishing they do. Each day essentially is priced at 10 dollars so the non-resident angler has multiple options to choose from to fish the desired amount of days with a consistent cost/value. For the non-resident seeking to fish beyond the traditional long weekend or week vacation the annual option provides them the best value.

New Mexico Interview

- Are there any problems that occur in day to day operations of managing the recreational fishing license program? The Department uses its own web-based license sales software. There are very few issues with the system, although occasionally a customer will purchase a temporary 1-day or 5-day license and enter the wrong start date. We generally void the purchase and require the customer to repurchase under those circumstances.

- How does the organization define a recreational fisherman? We don't have a formal definition, but for purposes of federal certification, this would be defined as anyone who purchased or obtained a fishing license. A license is not required for children under the age of 12, so it might more accurately be defined as anyone who engages in fishing activities in New Mexico.

- How does the organization define a recreational fishing license? Any license that allows the holder to fish using legal methods.

- How does the organization define fisheries management? The Department doesn't have a formal definition to "fisheries management" but we would define it as "Actively protecting, conserving, and improving aquatic resources to provide sustainable opportunities for recreational and long term persistence of native species based on science and in a manner supported by the citizens of New Mexico."

- Are there any other definitions that you feel are important to understand fisheries management?

- Are there any specific lobbyist groups or outside parties that tried to either prevent or support the recreational fishing license program? Who are they? What did they do? There are several non-governmental organizations that support fisheries management in New Mexico. Some examples of these groups include Trout Unlimited, New Mexico Trout, Muskies Incorporated, New Mexico Wildlife Federation, etc. These groups typically provide comments/support on fisheries management actions.

- How were the prices calculated for your recreational fishing licenses? Prices are set by the New Mexico legislature and are generally compared to other states and calculated based on the costs involved in administering the licensing system.

- What are the major costs involved in the recreational fishing license program? Prices are set by the New Mexico legislature and are generally compared to other states and calculated based on the costs involved in administering the licensing system.

- Have any external entities acted as a source of income or funding for the recreational fishing license program, or is it solely funded by the selling of licenses? Primarily funded through license sales. The Department receives federal money from an excise tax on outdoor equipment, but this is not specific to the licensing system.

- What are the conditions of marine life in your local waters? We do not have marine life in New Mexico. All of our aquatic habitats are fresh water. The conditions of our aquatic resources vary greatly. Several are impacted by long term drought. Recent average to above average winter snow packs have greatly improved our aquatic resources the past 2-3 years.

- Have there been any effects on the marine habitats due to the recreational fishing license program? If so, what are they? Overall the effects have been positive since our recreational fishing license program generates income and resources to manage and improve aquatic habitats. The Department has spent millions of dollars improving aquatic habitats for native and recreational fisheries the past 5 years.

- What complaints, if any, have the public had in the past about the recreational fishing license program regulations? New Mexico established fishing regulations since about 1909. Overall our regulations don't change significantly from year to year. So complaints are fairly low to moderate. The most significant complaint we receive is related to daily harvest limits, either too high or too low.

- How has the fishing community responded to any changes in regulations for the recreational fishing licenses program? Generally, our regulation changes are vetted or supported by a majority of our customers. Per the previous question, our regulations don't change significantly year to year, so overall the fishing community is typically adaptive to our regulation changes.