



Adoption of Citizen Science Practices: A Case Study of The Billfish Foundation's Tag and Release Online Database

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ADOPTION OF CITIZEN SCIENCE PRACTICES: A CASE STUDY OF THE
BILLFISH FOUNDATION'S TAG AND RELEASE ONLINE DATABASE

By

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A THESIS

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of the University of Miami
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Almost the entirety of our understanding of billfish science comes from recreational fishing and constituent based tag and release programs. A uniform, global resource where anglers can participate and view their efforts in action will greatly contribute to the understanding, conservation, and management of these mysterious animals. It was this rationale that led The Billfish Foundation (TBF) to create the Online Tag and Release Database (TROD) as a companion to its existing Tag and Release Program. The TROD was designed to galvanize the sportfishing community and streamline how constituent anglers report data.

Significant portions of active TBF members have not yet adopted the database. This is a group comprised of active participating captains and anglers. It is necessary for the future success of TROD to understand why this gap exists and how it can be narrowed. It is the aim of this project to alter and improve how existing members of TBF's Tag and Release Program report data by adopting the TROD, increasing the overall amount of data gathered by TBF and the speed in which it is received. A social marketing and outreach campaign geared towards existing active constituents of TBF will effectively shift the paradigm of how tag and release data is reported and recorded

through citizen science capacities. The need for this project is paramount for the large-scale success of the TROD; TBF's Tag and Release Program; and billfish science, conservation, and management.

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List of Abbreviations

BCA – Billfish Conservation Act

CBTP – Constituent Based Tagging Program

CPC – Cost Per Click

CTR – Click Through Rate

FAO – United Nations Food and Agriculture Organization

FAQ – Frequently Asked Questions

FMP – Fisheries Management Plan

HMS – Highly Migratory Species

IGFA – International Game Fish Association

MSD – Messaging Source Document

NMFS – National Marine Fisheries Service

NOAA – National Oceanic and Atmospheric Administration

PPC – Pay Per Click

PSAT – Pop-up Satellite Archival Tag

TBF – The Billfish Foundation

TROD – Tag and Release Online Database

Chapter I: Introduction

Recognized as one of the most sought-after big gamefish for their size, strength, speed, and rarity; billfish have influenced the growth of numerous recreational fisheries around the world (IGFA, 2001). These pelagic apex predators are characterized as highly migratory species (HMS) due to their vast geographical distribution in the world's tropical oceans and extensive migration patterns (Magnuson Stevens Fishery Conservation Act, 2006). It is these characteristics that often lend themselves to billfish and other HMS to being referred to as 'rare event species' (Prince and Brown, 1991). Consequently, it is this rarity that results in a lack of information regarding these animals' movements and distribution patterns, as well as basic life histories. The absence of this vital information, as well as their transits between multinational and international waters, makes it difficult to formulate effective policy to sustainably manage and conserve their stocks (Lynch et al, 2011).

To acquire more data on these mysterious animals, the scientific community enlisted the aid of recreational and commercial fishermen who regularly encounter billfish. Frank Mather pioneered the first tagging program, the Cooperative Tagging Center in 1954 out of Woods Hole Oceanographic Institution in Massachusetts (Ortiz, 2003). It was the original success of this program that laid the groundwork for the other constituent based tagging programs that followed. This joint effort between the researchers and fishermen, both with vested interests in the resource, was the genesis of constituent-based tagging programs (CBTP). These programs rely on constituents to voluntarily tag, release, and report recovered tags - greatly lowering economic costs and logistic concerns. The common objective of CBTP is to promote the concept of tag and

release to fishermen, while also gaining basic information on movement and migration patterns; age, growth and longevity; and stock structure or defining management units (Ortiz, 2003). Individual participation in CBTPs can stem from a variety of reasons including environmental stewardship, social gains and recognition, and policy influence (Schuett et al, 2014). Overall, they have been extremely successful with the recreational fishing community and are responsible for the bulk of collected knowledge regarding billfish (Ortiz et al, 2003).

1.1 Biological Importance of Billfish

Highly migratory species like billfish propose an interesting challenge to scientists and researchers. Relative to their vast range their numbers are relatively small and therefore infrequently encountered (Prince and Brown, 1991). Billfish will often patrol a geographic area over thousands of miles, following major ocean currents in search of food and reproduction. Their habitat includes temperate and tropical oceans around the world spending much of their time near the surface foraging on large schools of baitfish (Nakamura, 1985).

Billfish are easily differentiated from other pelagic fish by the elongation of the upper jaw into a long rostrum, which forms the famous sword-like bill. This unique evolutionary feature allows for billfish to slash at schools of prey and stun fish during feeding (Helfman and Collette, 1997; Nakamura, 1985). The morphology of billfish has also evolved over millions of years becoming extremely hydrodynamic and efficient, giving rise to the fastest fish in the sea (Nakamura, 1985). In order to survive the open ocean, billfish have a very rapid growth rate. The largest species, the blue marlin

(*Makaira nigricans*), can reach sizes of 500 cm (16.4 ft.) and 820 kg (1807 lb.) (Froese and Pauly, 2012).

According to Nakamura (1985), there are 12 species of billfish divided into two families and five genera. The family Istiophoridae whose members include the “true billfish”; *Istiophorus albicans* (Atlantic sailfish); *Istiophorus platypterus* (Indo-Pacific sailfish); *Makaira indica* (Black marlin); *Makaira mazara* (Indo-Pacific blue marlin); *Makaira nigricans* (Atlantic blue marlin); *Tetrapturus albidus* (Atlantic white marlin); *Tetrapturus angustirostris* (Shortbill spearfish); *Tetrapturus audax* (Striped marlin); *Tetrapturus belone* (Mediterranean spearfish); *Tetrapturus georgei* (Roundscale spearfish); and *Tetrapturus pfluegeri* (Longbill spearfish). The family Xiphiidae contains only one species, *Xiphias gladius* commonly known as swordfish. According to the United Nations Food and Agriculture Organization (FAO) (2014), swordfish are the most heavily commercially targeted billfish species.

As apex predators, billfish perform an essential role in marine ecosystems and their anthropogenic removal, such as a product of overfishing, could result in a trophic cascade (Paine, 1969; Pace et al., 1999; Casini et al., 2009). However, contrary to this school of thought, Kitchell et al. (1999), demonstrated that the simulated removal of billfish species, particularly blue marlin, from the central North Pacific ecosystem had marginal impact on trophic structure. Kitchell et al. (2006), further postulates that the economic value generated by billfish angling far outweighs their ecological value as apex predators.

1.2 Socioeconomic Importance of Billfish

Billfish first captured the imagination of sportfisherman the world over in the 1930's due to the well-known angling exploits of Zane Grey and Ernest Hemmingway. Hemmingway further popularized the massive fish in the 1950's with his literary classic, *The Old Man and The Sea*. It was in this novel that he effectively wrote the blue marlin into the collective mind of the public, mythologizing the giant fish as the “ultimate catch” in sportfishing. Until the 1950's billfishing was concentrated in few areas off the Atlantic and Gulf of Mexico coasts (Atlantic Billfish Fishery Management Plan, 1999). Over time, technological improvements of fishing gear and global connectivity have benefited the recreational billfishing industry greatly facilitating accessibility and growth worldwide. This growth has also given the community a powerful voice in the shaping of billfishing regulations and policy (Chaibongsai, 2007). In 2003, the number of billfish anglers in Atlantic waters off the United States was estimated to be 7,915 and 1,627 in Puerto Rico (Ditton and Stoll, 2003).

Today, billfishing is a multibillion-dollar global industry that has far reaching influence beyond the actual cost of fishing offshore. People often travel long distances for renowned fishing experiences, expanding the economic influence into other sectors of the economy. These can be direct product and service providers such as marinas, fishing guides and tackle shops to the businesses that help anglers enjoy their experience on the water such as restaurants, gas stations and hotels. In the United States alone, saltwater fishing accounts for over \$32 billion U.S. in economic multipliers (Southwick et al, 2013). In Costa Rica, anglers contributed \$599 million U.S. in 2008 to the economy – or about two percent of the country's gross domestic product (Jimenez et al, 2010). In 2007

and 2008, recreational billfish fishing brought in \$1.125 billion and 24,000 jobs annually to Cabo San Lucas, Mexico (Southwick et al, 2008).

The economic importance of billfish is further emphasized in actions taken by the United States government. In 1988, the Fishery Management Plan (FMP) for Atlantic Billfish was implemented to reserve billfish for recreational fishing by prohibiting commercial retention of Atlantic marlins. More recently, the importation of all billfish into the continental United States from other countries was banned by the passage of the Billfish Conservation Act (BCA) in 2012. Prior to its passage, the United States was the largest importer of billfish in the world, importing roughly 166 metric tons annually between 2001 and 2005 (Gentner, 2007).

1.3 The Billfish Foundation

The Billfish Foundation (TBF) is a science-based non-profit organization founded in 1986 with the purpose of conserving billfish populations worldwide. Since its inception, TBF has become internationally renowned due mainly to its keystone traditional CBTP started in 1990. Today, TBF's Tag and Release Program has grown to be the largest private international billfish-tagging program in the world with over 200,000 fish tagged. In its infancy, TBF's initial focus was on research and educational programs, but in 1990 that mission expanded to incorporate an emphasis on advocacy for responsible fisheries management. It is in this capacity TBF acts as a liaison between recreational fishing interests, regulators, and the various stakeholders in the fishery (Chaibongsai 2007). Successful billfish conservation is heavily reliant on the actions of

decision-makers who can be influenced by scientific studies; therefore, it is imperative to produce sound science to influence policy.

The vast majority of billfish data collection is informal; made possible by anglers who volunteer their time, effort, and resources to tag and report catches through TBF's Tag and Release Program. Scientists use the information gathered by these anglers to gain valuable insight into the biology and socioeconomic impacts of billfish. Citizen science, or public participation in scientific research, is vital to TBF's mission. By involving the public the base of citizens with a vested or personal interest in the environmental issue expands along with the public's sense of responsibility and urgency for conservation efforts. Without public involvement, moreover, billfish research would stall, halting the progress of billfish conservation resulting from a scarcity of scientific data steering fisheries management policy.

It is therefore critical for billfish research and conservation engineered by TBF's Tag and Release Program, to keep expanding angler participation and awareness. The Tag and Release Online Database (T ROD) aims to do this by galvanizing the offshore sportfishing community with a vast array of features and expanded sense of ownership for citizen science contributions. Having existing constituents, especially influential tag and release leaders, adopt and transfer over to digital tag and release entry is essential in developing the online community that TBF hopes to build.

1.4 Research Approach, Goals and Specific Objectives

The overall goal of this study is to increase the amount of constituent involvement and ownership in the tag and release process employed by TBF. In turn, this will increase

the amount of data received by TBF to be utilized in additional billfish research and to influence effective management decisions. Furthermore, this research aims to develop a framework for which other organizations can employ to increase constituent based participation. The specific objectives of this study are to:

1. Evaluate the current state of TBF's TROD.
2. Implement a wide scale social marketing and outreach campaign to galvanize constituents and increase TROD participation.
 - 2.1 Quantify changes in the TROD analytics in multiple areas.
 - 2.2 Assess Tag and Release Program participant perception of TROD through personal open-ended interviews.
3. Identify the most significant and effective methods of outreach and provide recommendations.

Chapter II: The Billfish Foundation's Tag and Release Program

2.1 Citizen Science in Action

It is estimated that 50-80% of what is known about the billfish fishery is derived from conventional tagging data (Hilborn et al, 1990). As of August 2014, TBF's Tag and Release Program has amassed 214,909 records since its creation in 1990. The success of the program can be attributed to the desire for anglers to be intrinsically involved in the conservation of the resource they love as well as the willingness to provide information to a private organization rather than a government entity. Additionally, they gravitate towards TBF and its program because TBF employees are themselves active and knowledgeable fishermen. This provides an added layer of comfort and willingness to participate. Captains and charter businesses also become involved because it is a way for them to herald their accomplishments to the community and increase prospective clientele.

TBF's Tag and Release Program offers three different categories of information: tag, release, and recapture. A tag event is when an angler physically implants a tag into the billfish and then releases it alive. A release is the healthy release of the billfish without implementation of a tag. A recapture is the recovery of a previously tagged billfish either dead or alive. All three of these categories provide TBF and its scientists with vital information on these fish and their life histories.

The international presence of TBF allows for constituents to tag and release all recognized species of billfish around the world. Some billfish species are so similar that it would be impossible to correctly identify them without in depth examination and analysis

of the animal. Some species are also still under debate within the scientific community on whether they should be distinguished as a separate species at all. Therefore, to simplify identification and reduce inaccuracies, TBF consolidates and recognizes seven species: black marlin, blue marlin, sailfish, spearfish, striped marlin, white marlin, and swordfish.

Biological and socioeconomic data is collected by TBF through a physical record of a tag event. Constituents purchase low cost plastic conventional tags (commonly referred to as “spaghetti tags”) that are paired with a corresponding tag card, matched with a six-digit identification number (Figure 1). These numbers allow TBF to know who purchased which tags, as well as, pair them with the data from the original event when they are recovered. The participant fills out a tag card with pertinent information regarding the tag event including name, date, location, species, and size (Figure 2). These traditional tags are much more practical for widespread recreational use over the larger and more expensive pop-up satellite archival tags (PSAT) that can cost in excess of \$3,000 each. PSAT provide an even more comprehensive view into the lives of these fish, however, because of the high cost and additional experience needed to utilize them correctly, they are not commonly used outside of professional research.

Once a fish is caught and under control, the angler carefully brings it to the side of the boat where it is then implanted with the tag. The target location is above the lateral line and behind the gill plates (Figure 3). This is done with a stainless steel application point on a hard plastic pole. Correct placement of the tag is very important, as it will ensure minimal harm to the animal. Attempting to tag an active fish is not encouraged as it can cause serious injury to the fish and those on the boat. After the tag has been placed, the hook is then removed or the line is cut as close to the leader as possible. Long fights

will usually exhaust the fish so it then becomes necessary to revive it before release. This is done by slowly towing the fish forward, which continues to flush water through its gills. Throughout this process it will begin to swim upright and regain color and proper tail rhythm, indicating when it is safe to release the fish. It is never encouraged to bring the fish out of the water as this adds unneeded stress and can physically harm the animal. This entire process of successfully implanting a tag is result of a great deal of teamwork from of the angler, captain, and mate aboard the boat.

In 2004, TBF added another dimension to the program by distributing release cards as an alternative to tags. These cards work in the same manner as their tag counterparts – minus the action of physically tagging a fish. After a fish is caught and released healthy, the constituent would fill out the fields on the release card (Figure 4). While unable to gain the some of valuable biological information associated with a tagged and recovered fish; these releases events provide important information related to fishing effort, as well as some basic biological information.

The corresponding tag or release card is filled out and then mailed to TBF's headquarters in Ft. Lauderdale, Florida. After lengthy travel times by post, the information on the cards needs to then be analyzed by staff members and physically entered into the database. This process can sometimes result in the collection of inaccurate data. Frequently encountered are issues attributed to poor penmanship and incomplete fields on account of the constituent who filled out the card. It is not uncommon for staff members to attempt to decipher what a card reads or match it to historical information known about the angler, which can be inefficient and time consuming.

However, these TBF tag and release cards provide many advantages to researchers such as the low-cost and elimination of logistical concerns (Chaibongsai, 2007). TBF scientists are able to collect global data without the associated costs of physically catching and tagging fish themselves. Moreover, billfish anglers possess a local and traditional knowledge of fishing grounds. This knowledge can range from where billfish are typically seen, to what bait is most effective in targeting an individual species (Chaibongsai, 2007). Tag and release data collected from the anglers provides a multitude of essential biological information on the migration patterns of billfish, growth rate, as well as socioeconomic values of the fishery.

2.2 The Billfish Foundation's Tag and Release Online Database

Society has become heavily dependent on Web 2.0 as a means of communication and traditional methods of gathering data needed to follow suit to maintain relevancy.¹ The original methods of reporting tag and release information to TBF have now become antiquated; after lengthy report and travel times through traditional postal means, the tag and release cards would then still need to be manually entered by TBF staff into the precursor to the TROD system and then physically filed. The original database did not allow for anglers to view their records or provide transparency of what became of their data, creating animosity amongst some constituents. Anglers were concerned that their effort and subsequent data was not being utilized in a productive manner, leading to a decline in tag and release reports and tag issuances.

¹ Web 2.0 is characterized by the change from static web pages to dynamic or user-generated content and the growth of social media.

This downward trend continued throughout the 2000's with event recordings decreasing almost yearly (Figure 5). There can be multiple reasons to explain this decline. One hypothesis is that the availability of free release cards in 2004 caused some constituents to switch over from the tag cards that needed to be purchased at higher costs. The economic recession during this period may have also influenced the fishing frequency of anglers, causing them to go out on fewer trips a year. The complexity of the existing system of reporting may have been too much effort and the return on investment may not have been high enough to warrant continued participation. There are currently studies being conducted at TBF to determine the exact causes of this downward trend (Katz, 2014).

In 2013, TBF released the Tag and Release Online Database (TROD) to the public to simplify data reporting, improve efficiency, galvanize participation, and promote transparency with collected data. The TROD can be accessed from the website tagbillfish.org from any computer or device with Internet access. On it, the user can look at any record (fishing event characterized by either tag, release, or recapture) that has been entered into the database. Prior to its public release, the TROD had been internally replacing the old DOS database that was originally utilized by TBF, as well as the reliance on physical filing systems. It currently houses all of TBF's historical data as well as being the channel for which all future data will be recorded.

For the first time, constituents and the public are able to access and view this data. A short registration page is all that needs to be completed before the user can access the database, free of charge. Once someone has registered they gain immediate access to all of the sites features. These include **My Catch Data**, where users can enter new and view

past events and export personal data; **Interactive Map**, which plots events on a virtual web-based GIS interface; **Reports**, where users can export various reports on data events; **My Profile**, where users can edit and update personal information as well as view current standings in TBF Tag and Release Tournaments; **Photos**, where users can upload photos; **Videos**, where users can upload videos; **Explorer**, this is where users can do their own analysis, learn more about recaptures, search all of TBF's historical data, and find billfish hotspots – each section containing many search refiners to aid the user in locating the exact information they desire; **Buoyweather®**, which provides in-depth analysis of current and past water and weather conditions worldwide; and **Tutorials**, where users can watch demo videos describing database features and navigation.

Consumers today are accustomed to a higher level of control with regards to communication between themselves and companies (Assaad and Gomez, 2011). TBF aims to follow suit with this business concept and apply it to the Tag and Release Program. Constituents are at the core of TBF's work, and social networking represents an opportunity to build an even closer and rewarding relationship with them (Assaad and Gomez, 2011). TROD incorporates many elements of Web 2.0 including sharing options with social media websites such as Facebook, Twitter, and YouTube. It is this level of connectivity that is essential in creating successful campaigns and recruiting new constituents. Streamlined integration with these services allows for users to post personal fishing events to their Facebook timeline, Twitter feed, and YouTube channel to be viewed by all of their connections, followers, and subscribers.

It is an excellent way for constituents to share their tagging activity with the public and embrace the “*tag and brag*” philosophy TBF is trying to instill. This also

brings awareness to TBF itself and is another avenue to drive membership and recruitment to the program. This feature can also be utilized from a business perspective as a promotional tool; as an example, charter captains can show pictures, statistics, catch details, as well as promote their business as ecologically conscious to their customer base.

A mobile application of the TROD is also in development and nearing a launch window. This will further allow users to be even more versatile in how they chose to access and utilize the database. While the TROD can be accessed from Internet enabled mobile devices, they are not optimized to do so. In the month of January 2014, Americans used smartphone and tablet apps more than PCs to access the Internet – the first time this has ever happened (O'Tool, 2014). Specifically, devices accounted for 55% of Internet usage, of which, apps made up 47% of Internet traffic and mobile browsers accounted for 8% with the remaining 45% attributed to traditional PCs (O'Tool, 2014). Smartphone and tablet adoption continues to increase with the expansion of high-speed 4G access and improved user experiences on mobile apps. It is necessary for TBF to develop this app on pace with current technology as trends indicate mobile access will be the most frequently used platform to submit data. The caveat is that if it does not, TBF may again fall behind the technology used by constituents and participation could decline.

Chapter III: Methods

A multifaceted social marketing approach was developed and utilized to reach and convert existing non-user constituents. Social marketing seeks to develop and integrate marketing concepts, principles, and techniques to influence behaviors and foster social change or improvement (French, 2013 and Lefebvre, 2013). By focusing on target groups within the population, campaigns and awareness are tailored with the purpose of achieving specific behavioral goals relevant to the public good (French et al, 2009). Specific messages will be designed based on certain audiences and their personas, in addition to valuable information gained from personal interviews with active constituents. These interviews will be used to understand why constituents are involved and how TBF can improve their participation and overall experience moving forward. The strategy will pull components and ideas from relationship marketing, business marketing, and branding, in addition to the overall social marketing campaign. Growth of the database will be explored beginning in April 2013, when the TROD site tagbillfish.org went live, through December 2013. Growth over this period will display the historical effectiveness of TBF's marketing strategies. January 2014 through September 2014 will serve as the time parameters in which to measure the effectiveness of the new social marketing campaign when compared to the previous year.

3.1 Establishing Conformity

It is crucial that TBF decide upon and implement a constant message and theme when marketing the TROD. A common practice within business to ensure uniformity of a

product's messaging is to create an outbound document that is distributed to marketing and corporate groups within a business. This is one of the first steps in preparing a go to market strategy for a solution (Nesrsta, 2014).² In the case of the TROD the solution is simplifying and improving upon TBF's existing Tag and Release Program.

To create a successful go to market strategy for the TROD a messaging source document (MSD) was created for TBF to be used internally (Appendix A). The MSD is the blueprint for all proceeding marketing endeavors by TBF as it pertains to the TROD. It will allow any other party at TBF to continue the same strategy by ensuring consistency in the future. This document functions as the approved source for solution positioning and messaging to be used in the development of all marketing, advertising, outreach, training, press releases, education, communications, etc. It explains the rationale behind the messaging and positioning of the TROD. It ensures that everything flows consistently from a common understanding of why the TROD was created and what problems it hopes to solve.

3.2 Marketing and Outreach Methods

This section describes the marketing and outreach tactics employed by TBF prior to the launch of the TROD to the present. TBF has been promoting the TROD since it went live April 2013 though the networks and resources available to the organization. Over time, some of these methods have evolved. Most have undergone improvements and have been given a greater amount of attention and resources by the organization

² A go to market strategy refers to how a company will prepare and deliver their unique value proposition to their target market.

while some have had their resources applied elsewhere. The most substantial changes made were the result of new information acquired due to trial and error and analytical monitoring. Additionally, the establishment of a MSD forced consistency, significantly impacting the messaging and wording delivered through each respective outlet.

3.2.1 *Web Marketing and Outreach*

The web has been the most utilized communication outlet thus far by TBF. Included in this is TBF's web page, billfish.org, which directly links to the database. Periodic updates to the website have been made to notify the public of database's creation, functions, and features. Similarly, TROD sponsors provide visibility through their websites and social media channels to their customer base. A monthly e-newsletter, titled *In the Spread*, containing relevant information, is created and electronically distributed to existing TBF members.

TBF is committed to growing a social media prescience that is comprised of Facebook, Instagram, Twitter, YouTube, and Vimeo. With the emergence of Web 2.0 technologies, customers are no longer satisfied with advertising and promotional information as the sole source for learning about new products and services. Customers are now accustomed to sharing amongst themselves their own direct experiences with brands, products and services. These opinions in turn, greatly influence whether other customers take action. The initial goal for TBF on these social media channels is to create content that engages customers or stakeholders transforming them from viewers to participants. In this sense, engagement means that customers are willing to talk to TBF as well as about it. Appropriately, TBF holds monthly video and photo contests with prizes

donated by sponsors. These contests are successful in creating engagement between TBF and its viewership. This process will greatly impact TBF as an organization as well as the TROD. (Evans, 2010)

More recently, a series of videos have been produced in an attempt to educate and galvanize constituents' participation. These videos were posted and shared on TBF's Facebook, Twitter, YouTube, and Vimeo social media channels; the billfish.org website; and as content in e-newsletters. The first of these was *MoneyFi\$h – A Waterlust Film About Billfish* (Meyer and Chaibongsai) in 2012 which highlights the unique combination of sportfishing and science. The next film produced was *Get Hooked* (DiNicola and Chaibongsai) in October 2013. This short film was created in an effort to capture the excitement of offshore fishing and the passion people have for it. A four part TROD tutorial series showcasing site navigation and function was created in November (DiNicola 2013). The release of *Get on Board* (DiNicola 2014) in January 2014 was the first published content of the new social marketing campaign. *Get on Board* was a short commercial created specifically for the TROD that would be used in promotional materials as well played at events. *With a Little Help From Our Friends* (DiNicola 2014) was released in August 2014 as another promotional video in the vain of *MoneyFi\$h* and *Get Hooked* to drive traffic to TBF sites and social media channels. These videos, combined with the reach of TBF and its sponsors on social media, have amassed ten of thousands of views from a broad and diverse audience, becoming one of the most successful forms of outreach in terms of exposure initiated.

A Google AdWords account was also created and utilized by TBF prior to the start of the study. Google AdWords is an online advertising service that places

advertisements at the top, bottom, or beside, the list of search results after a search query on Google. Utilized in the past, Google AdWords direct possible customers or interested parties to the billfish.org or tagbillfish.org websites. As a non-profit entity TBF is the recipient of the Google Grants program. “With this program, Google Ad Grants empowers nonprofit organizations, through \$10,000 per month in in-kind AdWords advertising, to promote their missions and initiatives on Google.com” (Google, 2014).

As a part of the Google Ad Grants program, TBF is allocated funds monthly to be applied to advertisement costs. However, the Grants program limits to how much money can be used on individual ads. Trial and error has resulted in spikes and lulls for traffic based on ads created and the money applied to them. It was a goal of this project to establish the best method for attracting customers and constituents. This involved creating new campaigns based on existing and new content and determining the best way to utilize awarded funds. Successful Google Ads are based on the distribution and assignment of various keywords applicable to content and search queries. If a keyword is too broad, it may gain more impressions, but ad quality decreases; meaning customers may click the link but never take further action on the site.³

A new outreach method was initiated by creating new e-mailing list from names of captains and anglers derived from TROD records. Normally, e-mail blasts or e-blasts from TBF are only sent to members and registered users on the system, however this ignores an entire group of anglers and captains that can be entered by other parties. When a tag card is filled out the person filling out the card has the option to add the name, e-mail, and address of the captain, angler, or mate on the boat with them. This person’s

³ Impressions refer to the number of times an ad is seen.

information would then be entered into the system, often unbeknownst to them. These non-registered participants would then have a series of records associated with their name. The new e-mail list is a way to directly contact and engage people in this population as well as continue a rapport with those already involved. For this study the list is comprised of 891 individuals with data taken from February 2010 through July 2014.

A series of e-blasts were sent to this group consisting of TROD specific information. The first was general information describing some of the functions and capabilities of the system for those who may not have been aware as well as a link directly to tagbillfish.org. Other content in subsequent e-blasts consisted of videos, new content, and tutorials. During the new campaign a total of three e-blasts were sent to this population base.

3.2.2 *Traditional Marketing and Outreach*

Informative articles are published about the TROD in TBF's quarterly magazine *Billfish*, providing advertising and instructions on how to sign up, navigate the site and its features. Similar articles are infrequently published in larger, more circulated publications like *Marlin Magazine* to improve viewership. TBF created postcards to provide basic information on what the TROD is and how to sign up. They were intended to be attention grabbing and limited on text, but also instructive. The original postcards were then redesigned to better align with TBF's new outreach campaign and to make them more visually stimulating (Appendix B). The new postcards were then created and distributed in all outgoing mail and at events beginning in July 2014.

Personal interaction with constituents at trade shows and fishing tournaments has also been instrumental in building the user base. Historically, this has been one of TBF's main channels in terms of educating the public and driving membership. One event consisted of short conversations and demonstrations of the database while at the 2014 Miami International Boat Show in South Beach Miami, Florida on February 13th through 17th. The annual event provides good exposure for TBF among a large and diverse group of people with 2014 drawing in 94,980 attendees (Miami International Boat Show, 2014). A raffle was held at the event to entice booth visibility and foot traffic through the area. In total, 11 discussions regarding the Tag and Release Program were started by both TBF employees and interested attendees. Of these 11, four signed up for the database that day on a demo station that was set up.

TBF also rewards participation in the Tag and Release Program as a form of outreach and public relations. For every release made by a member, TBF mails out a release certificate in appreciation of their hard work and conservation ethic. Many members are very enthusiastic to receive these certificates and to be personally acknowledged by TBF. TBF also organizes an annual Tag and Release Tournament where the members who tag and release the most billfish are formally recognized at an awards ceremony. Much like the certificates, these awards are in recognition for the hard work and commitment of captains, anglers, and mates and a source of competition within the community. Furthermore, captains and anglers take great pride in winning these awards and often showcase them amongst their accolades.

These methods and marketing techniques will continue to be used to contact interested parties and raise awareness for TBF and TROD. A cost benefit analysis will be

conducted for e-mail, social media, print advertising, video production, and Google AdWords.

3.3 Google Analytics

To provide a more in-depth analysis of source traffic and user flow from the campaign, a Google Analytics account was created and implemented for the TROD. Google Analytics is a service offered freely (for sites under 10 million hits per month) by Google that generates detailed statistics about a website's traffic and traffic sources and measures conversions and sales. A code snippet was set up within tagbillfish.org to track analytical data as well as traffic between individual database sites. A 75-day sample was analyzed to determine different areas of growth. Data tracking began on August 6 through October 19, 2014 for tagbillfish.org, the URL for the TROD. Within Google Analytics an exhaustive amount of metrics can be tracked and analyzed, including sessions, users, page views, pages/session, average session duration, bounce rate, and percentage of new sessions, country of origin, referral source and device.

To ensure Google Analytics collects the most accurate data from tagbillfish.org, filters were created for the IP Addresses of all TBF staff as well as site developers actively utilizing the database. With these filters in place, staff and developers are distinguished from general Google Analytics reports and not influencing audience metrics. Over time it became apparent that particular hits on the site were from robots and spiders, or automated programs visiting the site and not from actual people. These can skew data during analysis and lead to false inferences on traffic patterns. Once these were identified they were also filtered out of the Google Analytics results. This provided a

baseline to measure future growth in the TROD through various metrics as well as a much more in-depth analysis of user flow and interaction.

The lack of detailed historical Google Analytics' data represents a problem that must also be addressed. Since the account was not active until August 2014, there is no data within Google Analytics prior to this period nor can it be obtained. However, inferences can be made from the traffic patterns of certain events on TBF's main site, <http://www.billfish.org>, which has been actively tracking and recording data since June 2010. While this is not a seamless replacement for actual database traffic, Google Analytics from the database's sister site does indicate events that had positive or negative effects on a similar target audience. This availability of this data could shed insight into the possible influences on initial growth over the first year as well as aid in the development of future outreach components and strategies.

3.4 Initial and Stimulated Growth

To determine the TROD registration and usage rate, user logs were pulled from the database. These logs indicate the general amount of activity the site has seen since it went live to the public in April 2013 and can indicate user activity before Google Analytics was implemented. Before this date, the database was only available to TBF staff, for data entry, and the development team, for site maintenance. *Registration rate* refers to the amount of people who registered for the site and then logged in. *Usage rate* refers to the amount of participants logging in and how many times they do so over a period of time. Registration and usage rate for 2013 will be identified as 'initial growth' as it was prior to any large-scale targeted outreach campaign designed by this project and

dependent on the historical outreach methods previously discussed. Growth of the TROD in 2014 will also be assessed and identified as ‘stimulated growth’ as it coincided with the implementation of the new social marketing and outreach campaign. Data for this period will be collected through September. Stimulated growth will also be coupled with the more in-depth analysis attainable through Google Analytics post July 2014.

Stimulated growth will be a determining factor in providing cost effective recommendations for TBF moving forward.

An issue encountered when determining these values is that it is impossible to identify an accurate representation of time spent or activities performed while logged in without Google Analytics. For example, a user might login three times in one month and only enter in three records, whereas another user might login once over a three-month period but enter 50 records. Here, both users are interacting with the site and submitting data. One is given a higher usage rate with a count of three because of the multiple logins, where as the other is supplying more data, but has the lower usage rate of one because of single login session.

3.5 TROD Submission Ratio

In addition to registration and usage rate, event records were pulled from the TROD to determine the percent of data personally entered by two groups, captain and angler. This database pull consisted of an export of all event records entered in January through May 2014. This data shows all information pertaining to the tag or release event that is entered when it is recorded into the database. Additionally, captains may be anglers or vice versa. This results in an individual’s name being associated with both

titles depending on the event and how that data was entered. The highest number of records for each category (captain and angler) determined the title of ‘captain’ and ‘angler’ for that individual.

For the purposes of this study, the vital data needed was how many event records are associated with individual captains or anglers and who entered the record based on their unique login information. From this information a list was generated of all of the anglers and captains during the five-month period along with their TROD submission ratio. The TROD submission ratio is the percentage of records entered by the captain or angler themselves compared to those entered by TBF staff on their behalf. This list provided the names of the most active captains and anglers in the Tag and Release Program. The 50 captains and 50 anglers with the highest frequency of event records were chosen as the sample population size of existing active constituents.

A record was determined entered by a captain or angler if the associated User ID was not assigned to a current or past TBF staff member. Multiple User IDs could be responsible for entering records for one captain or angler, however these count toward the associated captain or angler’s total. For example, one captain may not personally enter data, but his crew does so on his behalf. These records would be calculated as entered by the captain.

3.6 Interviews

Conduction and collection of personal interviews does bring into account the reliability and validity of the results gathered. Especially in qualitative studies, reliability or the repeatability and consistency of results is especially difficult. It has even been

purported that to produce valid studies in the real world it is not possible to achieve perfect reliability (Taylor and Bogdan, 1998). The purpose of the interview component is to emphasize validity and provide insight by comparing the data with participant's thoughts and actions.

100 individuals, made up of the top 50 captains and anglers from the sample population, were contacted through e-mail and phone to arrange interviews in an effort to ascertain why they are or are not personally entering records. The interviews would also provide insight into the overall effectiveness of the social marketing campaign helping to identify which methods, if any, are influencing the target audience. Being the leading Tag and Release Program constituents, adoption by this group is key to changing the frequency of personal record entries and driving the desired paradigm shift. For this project, personal semi-structured interviews were determined to be a suitable method for gathering qualitative data. These interviews facilitated open-ended questions and discussions allowing for the exploration of individual experiences or opinions regarding TBF and conservation as a whole. A survey may not have been able to capture the full scope of questions in context as well as engage the wide variety of subjects within the sample population.

To keep interviews fluent and relevant, a guide was created with questions and topics to be addressed (Appendix C). However, due to the open-ended structure of these interviews, interviewees were encouraged to answer the questions in an unconstrained way. Frequently, an interviewee response would produce a tangent from one question and end up answering a question planned for later in the interview. The main purpose of the guide was to ensure all areas of the research would be covered and nothing would be

omitted. Interviews would often evolve into the free flow exchange of stories and ideas allowing for greater ethnographic insights into the interviewee and their interest groups.

A pre-test of the interview was conducted at the Mississippi Gulf Coast Billfish Classic tournament in Biloxi, MS. This was done in order to test the interview questions, questionnaire and planned analyses method. A total of five interviews were conducted at the event. Some minor changes were made to the questionnaire, such as more detailed explanations as to the purpose of the interviews and the explanation of the TROD to those who had no prior experience. Though while not part of the target group, these interviews were nevertheless included in the overall analysis.

Interviews were arranged after initial contact with the group members and were conducted in person and by phone. Some individuals requested to be interviewed via e-mail, as logistical constraints made the other options impractical. The international prescience of TBF resulted in a study group comprised of individuals from around the world and interview type was chosen according to their preference. In total 24 participants were interviewed: 1 in person, 8 through e-mail, and 15 were conducted over the phone. Each interview took between 20 – 60 minutes.

Chapter IV: Results

4.1 Billfish.org Analytics

To date TBF has been successful in exponentially increasing traffic to both the main billfish.org site as well as the tagbillfish.org site. The main sources of traffic for billfish.org are Google, direct, Facebook, Bing, Yahoo, and Facebook mobile (Figure 6). The most traffic driven to the billfish.org in a short duration of time was the result of an article titled “Baby Blue Marlin Story”. The story was picked up by Yahoo and drove over 7,000 people to the TBF site in its first 10 days. The story was again picked up and shared on the social network, news and entertainment website reddit.com and was the highest referral source for the month of September in 2014. The prescience on reddit resulted in 1,976 pageviews on September 26th alone.⁴ Over the entire lifespan of billfish.org, 54% of all referrals originate from Facebook and its mobile counterpart, stressing the importance of social media outreach and mobile device connectivity (Figure 7).

83.78% of all traffic on billfish.org is from the United States. New visitors make up 79.9% of page visits and 20.1% are returning visitors. Visitors are averaging 2.26 pages per session with average session duration of 00:01:26 and a bounce rate of 57.00%.⁵ The bounce rate refers to the percentage of single page visits. These can be instances where a user leaves the site from the entrance page without interacting with the

⁴ Pageviews is the total number of pages viewed. Repeated views of a single page are counted.

⁵ Pages/Session (Average Page Depth) is the average number of pages viewed during a session. Repeated views of a single page are counted.

page. Bounce rate can indicate that a user arrived on a page not relevant to them or not interesting enough to warrant further engagement

4.2 Google AdWords

In an attempt to improve the quality and effectiveness of Google AdWords for TBF, ad groups and associated keywords were refined and altered within five online PPC (Pay Per Click) online campaigns. Initially, TBF was using keywords that were too broad according to market research and Google employees. These ads were gaining many impressions and clicks, however the clicks were not relevant to the ad itself and leading to a high bounce rate. Additionally, with a maximum bid price of up to \$2.00, TBF was losing money from its Grants budget on users who were not interested in the content of the ad.

A minimum of 10 keywords must be chosen per ad so that Google knows when to display the ad during search queries. This is done in addition to the content of the landing page itself. The original keywords were changed to be more supplementary of individual ad content and germane to TBF's target audience. Successful keywords result in more impressions and improve how an ad functions, in turn affecting the quality score of the ad itself. Quality score is the metric used by Google to determine how relevant and useful an ad is to a user based on several factors. Quality score is multiplied by the maximum bid per keyword to determine the price in the ad auction process. The Grants program limits the CPC (Cost Per Click) to \$2.00 leaving TBF at a disadvantage when it comes to ad auctions, which governs when ads appear on queries. Other advertisers would be able to surpass this limit and win out on bids for certain keywords. It was therefore thought

necessary to determine and change ad keywords to those that could increase ad rank and win auctions at low costs in order to show up on the most relevant search queries for TBF's target audience.

The created ads varied in landing content from billfish.org to tagbillfish.org and created video content on YouTube (Figures 8 and 9). The overall result was an unexpected and dramatic decrease in clicks and impressions. It was hoped that changing to more relevant keywords would create a higher quality score giving TBF's ads more impressions and in turn a higher click through rate (CTR). The CTR is a metric that measures the number of clicks received on their ads per the number of impressions. What occurred were similar trends but coupled with greatly reduced impressions. One of the original ads for the Waterlust film *MoneyFi\$h* in June 2014 had 1,967 clicks with a CTR of 2.30% and the revised ad for the same content had 105 clicks with a CTR of .24% in September 2014.

To see the actions of users after they arrive on a landing page from an ad; Google Analytics was linked with Google AdWords. Unfortunately there have been no instances of users clicking on an ad that lands on the tagbillfish.org page. This is the only link activated between the two Google services and it is not currently possible to track user flow originating from the ad and landing on the billfish.org page.

4.3 Tagbillfish.org Analytics

4.3.1 Overview

The implementation of Google Analytics on the tagbillfish.org site revealed deep insights into the TROD and the overall user experience. With this service in place TBF

can monitor the growth of the TROD in multiple areas. Over the course of a 75-day study period a total of 1,352 sessions were recorded with an average of 18 a day (Figure 10). Sessions for the Google Analytic portion of this study were comprised of all visits to the TROD main page and such do not represent a count of registered members. Registered members would then enter their personal account information and login to the TROD system.

Of the 1,352 sessions, new users accounted for 55.3% and returning visitors accounted for 44.7% (Figure 11). It is of note the new user group can contain existing users that are accessing the TROD through a different IP Address. New users accounted for 4,396 pageviews and returning users accounted for 6,945 pageviews. The average page depth, or pages viewed in a single session were 5.88 for new users and 11.50 for returning users. New users had an average session duration of 00:04:12 compared to returning users 00:09:31. The bounce rate for new users was 62.43% and 37.75% for returning users. These two groups within the date range combined for 11,341 pageviews with an average of 8.30 pageviews per session and an average session duration of 00:06:34. The total average bounce rate for the TROD was 51.41%. The highest amount of sessions in a single day was on September 8th after the first e-blast to TROD participants. This event attracted 39 new users a 178.57% increase from the previous week. The majority (75.15%) of users speak U.S. English and access the site from within the U.S. (48.45%) (Figure 12). A complete breakdown of analytical data can be found in the appendices.

4.3.2 *Visitor Acquisition*

Organic visitor acquisition primarily comes from four sources: referral, direct, organic search, and social (Figure 13). These sources can further be broken down to see the precise method that has influenced a new user to travel to the TROD site (Figure 14). The largest gateway for these new users is through the main billfish.org website and the second is through direct access. Direct is when a user would enter tagbillfish.org into the address bar in the Internet browser. Entering billfishtag.net would similarly redirect a user to the tagbillfish.org homepage. Nearly 7% of new users enter the site through Google search queries. Facebook and Vimeo both combine for about 3% of total new traffic to the TROD entrance page.

4.3.3 *User Flow*

User flow can also be mapped and provides the through traffic and drop off locations of all TROD visitors during sessions (Figure 15). All session traffic begins at the login or landing page and then drops off or continues through to subsequent pages in the database. 31.1% of new users continue past the landing page (1st interaction) and the remainder drop off here and have no further interaction with the TROD. 45.69% of this through traffic proceeds to login to their account, accessing the My Catch Data page and 7.76% navigate to the password recovery page. These actions indicate these visitors are returning users signing in from a different IP Address or in the case of the password recovery users, unsure if they have previously created an account. 24.57% of new users access the online tutorial section and 21.55% of new users continue to the registration page as their first interaction. After the first interaction page there is a drop off rate of

27.16%, the 2nd interaction has a drop off rate of 26.47 and the 3rd interaction has a drop off rate of 12%. There is a likelihood of 16.78% that a new user will travel through to a third interaction on the TROD. By comparison, there is a 38.9% percent likelihood that returning users would travel through to a third interaction.

When analyzing the data on September 8, after the first e-blast, new users had a through rate of 53.8% from the landing page. 42.86% of these new users went on to register for the database and 33.33% viewed the tutorials. Of the new users who viewed the tutorials 28.57% went on to register. The subsequent e-blasts were not as successful as the first in this regard.

4.4 TROD Growth

The registration rate for the TROD was determined by the first login by a user. This was deemed to be the most effective way to show registration followed by activity and omits registration with no follow-up activity. Since April 2013 there has been a total 299 registrations. Initial growth for the TROD steadily increased before decreasing in November and December 2013. The period of stimulated growth contained the months with the highest registration rate, which occurred in January and February, immediately after implementation of the new campaign (Figure 16). Within the period of initial growth, 87 users registered and logged in to the TROD. This figure increased to 212 for the period of stimulated growth for a registration rate increase of 143.68%. When comparing the first six months of initial growth (April, May, June, July, August, and September) with the same months in 2014, we see that registration rate increased from 37

to 122 for an increase of 229.73%. Additionally, the month of August in the initial growth period had a registration rate of zero.

Usage rate increased exponentially over the 18-months the database has been live. The most active month by user logins during the period of stimulated growth was March and least active was May (Figure 17). 67% of users had actively participated on multiple occasions, defined as at least two logins. The mean user count and mean total logins increased by 224% and 141% respectively, from the initial to stimulated growth period. The average logins per user was 3.7 with a population standard deviation of 2.34.

4.5 Entry Breakdown by Captain and Angler

38.4% of all tag and release data comes from the top 50 captains and anglers or top .8% of all participating constituents. The TROD submission ratio was determined for the sample population for each group. Of the 29,891 event records attributed to captains, 52.7% is made up of the top 2%. Correspondingly, the top .5% of anglers makes up 23.3% of the 28,349 event records attributed to them. As expected, TBF staff and employees entered the majority of the data for the sample population size; captains entered 13% of the reported data and 13.8% was entered by anglers (Figures 18, 19, and 20).

4.6 Interviews

12 captains and 12 anglers were interviewed based on replies to the 100 e-mail correspondences taken from the tag submission list. Interviews were somewhat difficult to arrange due to the differences in time zones and the busy work schedules of the

participants – particularly captains. All respondents were more than willing to provide assistance for the study and arrange interview times that were convenient with all parties. Once the interviews began, much was revealed of the perception of the TBF, the Tag and Release Program, TROD and billfishing in general. The passion that these individuals have for this sport as well as the conservation ethic for the resource was very apparent.

4.6.1 Captain Interviews

Many fascinating individual stories were shared ranging from globetrotting adventures to continuing a family's tradition and business. All of the captains shared their personal histories and how they came into their line of work. Five of the captains interviewed lived outside of the U.S. (Gabon, Africa; Costa Rica; Western Australia and two from Guatemala). The remaining captains live across the U.S., including one in Hawaii. Captains may often travel internationally for fishing opportunities during peak season in the summer months. All of the captains interviewed were male with ages ranging from 33-71 years old with a median age of 48. Amongst all of the captains there is a collective total of over 350 years of fishing experience and an average of 30 years. The veteran captain interviewed had 55 years of experience where as another just recently started a charter business and only has 6 years experience.

The reasons captains gave for billfishing were as diverse as their personal histories, but they all carried a common underlying theme: the excitement and thrill they get from billfish fishing. All cited the moment the fish bites the line, or "hits", as a major contributor to this. Many captains additionally credit the competitive aspects of the sport and its challenging nature for keeping them engaged for so long. A large percentage also

revealed the conservation of the resource as well as a general fascination for the species was a significant driver. It was also not uncommon to hear a captain describe billfish species as “beautiful” and “powerful”; two qualities evoking different emotions not usually paired together. Sometimes the simplest answers were the sincerest and most indicative of the fishermen lifestyle, as was the case with one captain’s response, “fishing is in my blood”.

The captains’ experience with the Tag and Release program is also varied. Some captains have been with the program since the founding of TBF where as others have joined more recently. This trend follows closely with the ages of the captains themselves. The older the captain is the more likely they would have joined the program earlier, whereas the younger captains will have joined more recently. Three of the captains began tagging with the National Marine Fisheries Service (NMFS) prior to any involvement with TBF. The overarching theme for participation has been to “improve the science and conserve the resource”. Captains also enjoy the opportunity to talk and educate their clients about the program and conservation efforts in the fishery. As stated by many, “fishing is my livelihood” and some of older captains claim they are witnessing the depletion of the resources firsthand. One captain speaks about his previous experience tagging tarpon on the west coast of Florida and how easy of a transition it was to continue tagging once he started his offshore charter business in Costa Rica. He says it was because tagging is a cause he was already passionate about and one he wished to continue and share with eventual clients. He further goes on to say that he “hates the practice of hanging a good fish just for a picture” and by releasing the big fish you are giving the population a chance to recover and improve.

A few captains described their attitudes of tagging programs over the years and how their personal participation has been staggered. This was a direct result of their concerns about the health and safety of the fish during and after tag implementation and the lack of visible results for the hours of volunteer work. One also describes how in the beginning of tagging programs there was a thought that tagging helped commercial long line fleets. There was also a perception held that there was enough data gathered already from traditional tags prior to the 1990's and that the program only existed to "keep people on payroll" referring to TBF and other constituent based tag programs. These captains cited improvements in education and outreach as to why they restarted their participation. One even credits that it was the actions of a client that brought tags on a fishing trip that reinvigorated his participation in the program.

Of the 12 captains interviewed, 58% have heard of the TROD, whereas 42% were not aware of an online method of reporting tag and release data. Captains aware of the TROD were informed by first-hand and regular communication with TBF staff. One individual had no referral and learned of TBF and the TROD through a combination of online research and social media. Of all captains interviewed, 50% now actively use the TROD. 42% use it to enter tag and release information online in addition to sending in physical cards. The exception is the individual who sought out TBF now enters all tag and release information exclusively online. Additional features used by this group include the 'Explorer' section, used by 50% of actively using captains and social media sharing services, used by 17% (one captain). The average age of active TROD users among captains is 44 where and those who use more than one feature is 37. The average age for the non-user group is 55.

For captains that actively use the TROD they cite convenience, accessibility, sharing features, research and record keeping. A few also applauded the evolution of the database from its first iteration to its current form. Veteran captains cite that they are “stuck in their ways” and do not wish to switch over to electronic submission because they believe with that comes a high learning curve. One explains, “I suspect the young guns will love the new tag and release database, but I do not think that it was intended for the old dinosaurs like myself.” By their own admission, active users also attest to a high learning curve when they initially started.

Overall, impressions of the TROD by those captains who were familiar and had experience with it were positive. Those who did not use it thought it was a good idea for tech savvy individuals and the younger generations to start submitting tag and release information online. Additionally, the most cited reason a user would return is ease of access for submitting data rather than any of the ancillary features provided. Actively using captains also attest that there is room for improvements.

4.6.2 Angler Interviews

11 anglers from across the U.S. and one angler from Western Australia were interviewed as part of the angler group. Angler’s locations were determined by their permanent address. The 12 interviewee’s ages ranged from 12 to 70. The median age for this group was 49 with an average of 46. This group was also comprised of four women and nine men. As with the captains, anglers will also travel internationally for favorable fishing experiences. Fishing destinations included Australia, Mexico, Costa Rica, Panama, Guatemala, Africa, Portugal (the Azores) and the Caribbean. Some anglers also

fished domestically off of the coasts of Florida, Maryland, North Carolina, California, and Hawaii. Again, recurring themes describing their affinity for fishing connected all members of this group, along with the captains. One angler summed it up as:

The relaxation of being out on the water... and the expectation. The adrenaline fueled thrill of a hookup, the fish jumping, and the tag. The teamwork needed to do all this quickly and effortlessly is why I billfish.

Additionally, some anglers cited growing up as an avid hunters and outdoorsmen which eventually progressed to billfishing after being given the opportunity. Both hunting and billfishing offer similar rewards and experiences to these individuals, such as spending time outside in nature along with the challenge of the hunter/prey relationship. The conservation aspect was also a large reason why participants enjoy the sport. Perhaps the most interesting and sincere reasoning was provided by a female angler who began billfishing as a therapeutic means of dealing with the loss of her mother. After her initial exposure she was hooked for the same reasoning provided by the rest of the interviewees.

Most anglers gave favorable reviews for the Tag and Release Program and provided similar reasoning for involvement as the captain group expressed. One female angler described her participation in the following way:

I participate because I am passionate about ocean conservation, and I think TBF is the leading organization dedicated to billfish. I never want to imagine an ocean without billfish. Tagging is a really simple thing. It's easy and fast, so I could not think of a reason not to tag/release because it is so beneficial to the team of people researching these species.

Another angler explains how he has seen the population of white marlin recover off the coast of MD and feels it is a response to captains and anglers becoming more educated about fish stocks, and the acceptance of circle hooks because of TBF's actions.

In addition to a conservation ethic, one angler said their main motivator was winning TBF's tag and release competition and that they participate despite the expense of the tags. Another angler believes that string tags do not provide much information when compared to the trauma and damage anglers are doing to the fish when they implant them. For this reason he only submits release information and believes TBF should focus more on pop-up satellite archival tagging (PSAT).

The anglers were then asked if they knew about the TROD and what their overall experience with it has been. 58% of the 12 anglers, with an average age of 57, heard of the database through regular contact with TBF staff. 33%, with an average age of 23, heard about it through other means. These included a postcard in the mail, notification after a recapture, during TBF's award ceremony, and a combination of magazine articles and social media posts. Only one, a 55-year-old male angler did not know of an online method for reporting tag and release data. After he learned of it, he was very enthusiastic about trying electronic submission after his next fishing trip, as well as telling his captain and mates. He then remarked that TBF needed to do a better job advertising it. Another angler explained that while he had heard of it, he has not attempted to use it because he felt he did not have nor want to take the time to do so.

While all 12 anglers think the idea of the TROD is good and has potential, five, or 42%, gave it a negative review or had a negative user experience after attempting to submit tag or release records. Four of these anglers reported having many technical difficulties when initially trying to enter data. The average age for this subset was 59. Two of these anglers discontinued use out of frustration and have not attempted to try again; their average age was 67. The two anglers who stopped reveal how they attempted

to use the database when it was first released and that they may attempt to use it again if it has become easier to use.

Another angler within this group explained how he is concerned about the possibility of incorrect or falsified data being entered into the system. He believes that anglers may try to do something misleading to win the TBF awards competition and “by mailing physical tag and release cards to TBF there is a system of checks and balances”. The angler goes on to say that when he used the database his release data was being submitted incorrectly – due to user or system error – and regardless of how it happened it poses a problem that could potentially corrupt the entire database.

Two other anglers reported issues, but continued use of the TROD feel they are now more comfortable. They cite a large initial learning curve and how periodic updates have improved the overall experience. They continued use because “even though it was sometimes difficult and frustrating it was still easier than hand writing cards”. The average age of these two anglers was 51.

The last angler to give a negative review did not cite any technical issues, but did not find he was “overwhelmed” by the features offered. He felt that in its present form it did not warrant his time and energy to submit his own data. This angler says, “In its current state it is nothing more than a data repository”. Based on these experiences the drop off rate for the anglers who used the TROD was 25%.

Positive reviews came from anglers who enjoy the ability and convenience of entering tag and release information online as well as the additional features offered. Of the anglers interviewed 42% actively use the TROD with an average age of 35. While all of these active users input tag and release data, 67% are using other features including the

Explorer section, Buoyweather, and social media integration. The average age of active users among anglers utilizing these supplementary features is 29.

Chapter V: Discussion

The vision of TBF's TROD and Tag and Release Program is to provide scientists and policy makers the necessary data to sustainably manage billfish stocks without compromising the economies of coastal communities. The TROD is an accessible tool that scientists and policy makers can utilize to make informed decisions. For this vision to reach its potential TROD activity and participation must increase. A larger quantity of accurate data will contribute greatly to the reliability and overall efficacy of the TROD as a science and policy tool and the Tag and Release Program as a whole.

5.1 Potential Membership Conversion

Determining the amount of memberships gained through the database is also important when looking at the success of the TROD and how it can translate to monetary gains for the organization. TBF raises much of its funding from memberships beginning at \$50 and larger membership contributions in excess of \$10,000. Since April 2013 and through September 2014, 62 registered TROD users were also active TBF members. This accounts for 20% of all registered TROD users. Nine of these memberships were purchased or renewed after April 2013 whereas the remaining 53 memberships were purchased or renewed in 2014.

In 2013, registered TROD users donated \$890 in memberships to TBF. Five new TBF members attributed to 30% of these gains. 18 new memberships in 2014 accounted for 27% of the \$5,495 donated. The values of new memberships are not only immediate,

but extremely profitable long term. A member could potentially donate thousands of dollars over their lifetimes and bring in other potential members.

It can be inferred that free access to the TROD was a determining factor in gaining these new TBF members. By registering for the TROD, they will become more associated with TBF and therefore more likely to make monetary contributions by purchasing memberships. Another possibility is that existing members register for the TROD because they already have an established connection and are more exposed to TBF. The longevity of the database itself may also contribute to whether members choose to renew their memberships the following year and that it is a service worth donating towards.

5.2 Cost-benefit Analysis

The cost-benefit analysis for this study was determined by calculating the estimated costs incurred from the marketing and advertising work executed based on local market prices for similar services. The estimated cost for all services rendered over the course of this study was an estimated \$41,120 (Table 3). The benefits of the study, while not monetary, include a greater customer base, greater visibility and outreach, greater customer satisfaction, and improved TBF and TROD reputation. These gains are necessary to grow TBF as an organization and fuel it's goals as well as influence sales and donations. Additionally, if the TROD campaign is successful in bringing in new members then it should help to generate future profit.

The majority of work done during this study was to identify and establish successful marketing and outreach methods TBF could utilize at minimal cost. Existing

staff and interns can perform many of the tasks outlined in this project. Video editors and graphic designers can be hired on a need by need basis if required. This portion of the study cost roughly \$7,520 and would likely be the only monetary costs to carry over if the campaign is to be continued.

5.3 Building Upon Success

The overall success of the social marketing campaign of this study should be based on progress made in establishing effective means and ways of collecting data about and from the TROD. Designing a messaging position and marketing strategy will be integral in building the TROD and growing its user base. These tools will be instrumental in determining a how to effectively engage constituents into adopting advanced citizen science practices. Constituents must take further ownership of tag and release data through TROD submission and TBF needs to validate why they should. Electronic submission through the TROD will allow TBF to gather more data more quickly and allocate resources away from data entry. It is also believed that the Tag and Release Program will amass more constituents based on the simplicity, instant gratification, and personalization of the TROD system.

As the results indicate the success of the social marketing campaign is apparent. More users are registering and utilizing the database in 2014 than in 2013, with these numbers continuing to show steady growth. A larger population of users should also translate to a higher population utilizing the TROD for their premier submission method for tag and release data. Since TBF is now promoting the TROD so heavily, including it with all Tag and Release content, it seems to reason that more new users will be aware of

its presence. After 17 months online, the TROD is not the same systems now as it was on day one. The alterations made to the database since should translate into a more intuitive and intelligent system for new users.

Among Tag and Release Program members, this study showed that TBF staff themselves enter the vast majority of data into the TROD system. The main divergence between active and non-active use was revealed to be age. Age of the angler or captain played a decidedly key factor in how members first learned of the TROD, if they attempted to use it, if they actively use it, and what functions they perform on it. Older members were more likely to have learned of the TROD through direct contact with TBF staff where as younger members became aware of it through other means, including social media. The average age of using captains and anglers was 40, whereas the average age of aware non-active captains and anglers was 54. The average age of active users who utilize the TROD's supplementary features is 31, and the user who said they routinely access these features most often is 12.

It is apparent that younger users tend to gravitate toward an online database for reporting tag and release information, as well as additional features related to the program. This can stem from younger users having grown in tandem with home computers and are more inclined and conditioned for the transition to a digital reporting system. Future analysis should continue to show this trend with the majority of active TROD users being overall younger than non-active participants.

Older users were also more likely to stop use after encountering technical issues while younger users would continue to use the TROD despite encountering similar, but less frequent, issues. A commonly encountered issue is the loading times when entering

an angler, captain, or mate's name in the database. When a user enters text characters in to these blank fields, the system automatically begins searching after a few seconds.

Many users admit they are not efficient typists and need to look down at their hands when they do so. By doing this, they do not realize the system has already begun to search as they continue to type. This situation results in incomplete data entries and user frustration.

It was the intent of this study that the methodology used could be transferred to other citizen science based programs and efforts. For individuals to adopt citizen science practices an organization must first identify who their target audience is and then determine why it is they should participate. They are performing a service for the organization either for free or at a cost. While some will act altruistically, incentivizing actions may drive up adoption, especially if there are costs for participation. As expressed in this paper, incentives need not be expensive. Utilization of organizations resources, including visibility, can be beneficial in this regard. In this study, most interviewees mentioned some form of incentive offered by TBF as reason why they initially became involved or continue to participate. Direct engagement with constituents is also very important as it builds a relationship between parties involved. Further analysis should be conducted after implementation of the following recommendations to properly assess the impact of each on participation.

5.4 Recommendations

Further analytical monitoring should continue to determine the preferences of active users. These may include time and seasonal trends that influence traffic and certain

activity within the database. From the interviews, anglers and captains tend to wait until they return home from a fishing trip before accessing the TROD to enter tag and release information. Depending on where and what species they are targeting and where they are traveling to, some months may have more traffic than others. It is difficult to assign any trends of this capacity only 17 months after launch and with 75 days of in-depth data tracking with Google Analytics.

It would behoove TBF to further optimize their Google Analytics account to monitor success of the TROD. Google Analytics data tracking can be enhanced by establishing Webmaster Tools within its Search Engine Optimization feature. This feature would provide very beneficial data of what particular keywords users are searching when they encounter the TROD site and which of these eventually lead to conversions or registrations. Knowing the exact keywords used by new users to find the TROD can then be implemented within Google AdWords to optimize its performance.

In its current condition Google AdWords has not provided a measurable increase in traffic and visibility for the TROD itself. The bid limitations are likely the reason for low ad rank and thus poor performance. For TBF to be successful in this realm they would need to leave the Google Ad Grants program and independently assign bid values above \$2.00. By increasing the cost per click (CPC), TBF would become more competitive in terms of online advertising through Google, but also creating additional expenditures. Therefore, it is not recommended that TBF take this route at this time. Instead the organization should continue with Google Ad Grants and attempt to refine keywords that are successful within the CPC limitations.

TBF should also continue expanding its social media presence. More than half of all referrals to the billfish.org site originate from Facebook. Individuals directed from Facebook are then exposed to TBF content on the main site as well as links to the TROD. From there, it is likely some of this group could then have been directed to the database and subsequently converted into TROD users. TBF should intensify their efforts to attract and convert people from this population. Altering or promoting areas of billfish.org can funnel traffic down paths that lead to the TROD or motivate a user into taking action. More direct links can also be utilized to the TROD itself on social media. With an established presence of over 17,000 likes on Facebook, TBF's organic reach is greater now than ever before and it should be utilized to continue to raise awareness for the organization and the TROD.

One of the most successful facets in creating a large viewership on Facebook, as well as other social networking services, was the frequent posting of content. Specifically, content that TBF constituents and related groups would find interesting and want to share. The success of the "Baby Blue Marlin Story" is a prime example how a post can gain traction and become viral. Original content, like the multiple videos that have been produced, are also an exceptional way to create new viewership and promote partnerships with other companies. This is the foundation of alliance marketing, where two or more companies come together to promote a concept that benefits all parties. By continuing this theme and producing additional content, TBF and its partners together are able to pull resources to reach a much larger audience than they are able to individually. In-house videos should continue to be produced for TBF. Raw video contests are organized monthly and provide a way to engage constituents and share their billfishing

experiences with TBF. These videos can then be used in future TBF productions. This provides a great sense of pride for the original owners as well as a high level of exposure through TBF.

The interviews illuminated that existing Tag and Release participants and TROD users enjoy the “Weekly Tag and Release Online Database Updates” posted by TBF on social networks, perhaps more than was originally believed. To them it is rewarding to see the research and results made possible by their contributions and efforts. This was shown to be a main motivator for continued use.

Interestingly, some of the negative comments regarding the Tag and Release Program is not enough of the results achieved through participation are shown to the constituents. This is something TBF has hoped to rectify with the TROD and increased social media presence, specifically the “Weekly Tag and Release Online Database Updates” posts. The constituents who wish to see more are also those who do not actively follow TBF on social media channels. In an attempt to increase visibility for these constituents, TBF can continue to utilize the new e-mail list created in this study and expand upon it by adding the additional email addresses of non-registered participants. At the timing of this study there have been 2,506 email addresses entered into the database all of which represent possible users. Furthermore, all interviewee’s expressed e-mail is a good means of direct contact. Simply by releasing the same weekly Tag and Release update information in an e-blast to these constituents, their perception of the program can positively change.

Some participants also enjoy the idea of sharing catches on their Facebook pages, but criticized how it can only be shared on personal pages. Unfortunately due to

Facebook policy, there is no remedy for sharing catch and release data on business or place; company, organization, or institution; brand or product; artist, band, or public figure; entertainment; cause or community. However, instructions or a video tutorial showcasing an alternative way to post personal catch and release data should be created. This feature in addition to a constituent being able to share data is also another avenue for TBF to increase their visibility.

Some of the anglers and captains who discontinued use did so after accessing the TROD early after its release in 2013. The TROD was launched initially without a successful beta or internal test. Had this been performed then perhaps technical problems and bugs would have been identified and rectified before the public had access. Instead, issues were addressed and corrected by programmers as staff and users encountered them. This early build may have been enough to deter possible users permanently from entering tag and release information online as well as utilizing additional features added post launch. It poses a challenge for TBF to reestablish trust after participants were alienated due to poor initial experiences.

A resolution and recommendation, brought up by a few interviewees who had technical issues with the database, is the creation of a frequently asked question (FAQ) section as well as to more prominently advertise the tutorial videos. Had users have had access or known about aids and references such as these, some of their issues would have been resolved more quickly. This may have altered users early perception of the TROD and retained participation.

It would further behoove TBF to expand the categories of their annual tag and release tournament. The creation of a separate category, which recognizes online data

submission through the TROD, would be the most effective method to immediately increase participation. Interviews revealed the competition aspect of billfishing is a major component and contributor to an individual's involvement in the Tag and Release Program. The success of the first award can lead to the implementation of separate awards for captains, anglers, mates, species, and oceans.

Continuing to provide unique and exciting features, as well as expanding the TROD with a mobile application for smart phones and tablets, should encourage recruitment and solidify user engagement, especially among younger constituents. If current trends continue then mobile access will be the most frequently used platform to submit data. The caveat is, if it does not, TBF may again fall behind the technology used by constituents and participation could decline. Internal testing or a beta test for the mobile application should be completed before it is made publically available. This will give TBF time to identify potential issues and fix them prior to a public launch. This should curb some of the concerns and allow for TBF to properly advertise the mobile version of the TROD before its release. It is paramount that the initial impression is positive, and the mobile application is well received, if the mobile application is to succeed.

Chapter VI: Conclusions

Sixty years after the first constituent-based tagging program (CBTP) began, there are still aspects to billfish and their lives that remain a mystery. The offshore sportfishing industry and many coastal economies are reliant on the survival of these imperiled species. Positive strides in management and protection have helped billfish populations in recent years. Much of the science influencing these laws and policies is derivative of the work of citizen scientists from around the world involved in CBTPs, like The Billfish Foundations (TBF) Tag and Release Program. To amass more accurate data and galvanize the offshore sportfishing community, TBF has created the Tag and Release Online Database (TROD). It is a resource where captains and anglers can enter billfish tag and release information online, rather than handwriting and mailing in physical cards. By transitioning to digital entry for tag and release, participants have the unique opportunity to have complete ownership of their data. TBF stands as the leading organization ushering in a new approach of conservation work and changing the paradigm of the citizen science ideology.

Figures

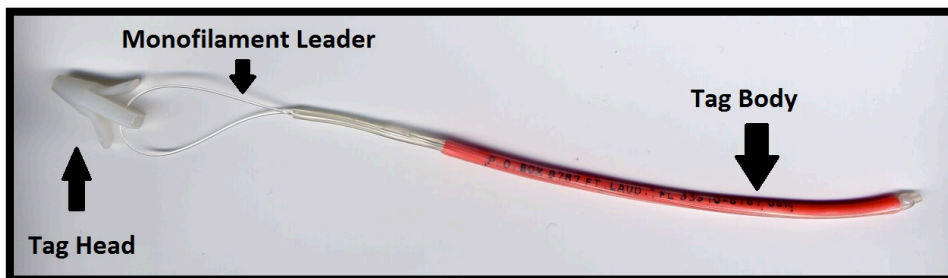


Figure 1: TBF Tag

Get Involved!		TAG DATA REPORT		BFA 486131	
Circle One: or Spec. JPL / IND / MID / PAC		Check Box of Species Tagging		☐ Black ☐ Blue ☐ Red ☐ Green ☐ Orange ☐ Silver ☐ White	
MONTH DAY YEAR LOCATION		Circle One: Species		Lat. North / South Long. East / West	
		Length: $T_L/100$ Weight: $T_W/1000$ Fight Time: HR: MIN:			
Circle Fish Condition: Excellent / Good / Fair / Poor		Remarks:			
Circle Sex: Male / Female / Unknown		Circle Hook: Yes / No		Was Tag (previously tagged) Tag # _____	
Tournament:					
HUNTER'S NAME & TBF ID #				☐ MALE ☐ FEMALE	
HUNTER'S ADDRESS (Don't forget zip code and county)				☐ Check if this is an Updated Address	
POUNCE NAME & TBF ID #		HUNTER'S E-MAIL ADDRESS		PHONE # () -	
CAPTAIN'S NAME & TBF ID #				☐ Check if this is an Updated Address	
CAPTAIN'S ADDRESS (Don't forget zip code and county)					
CAPTAIN'S E-MAIL ADDRESS				PHONE # () -	
BOAT NAME		APPROXIMATE LENGTH (OPTIONAL)		OWNER'S NAME & TBF ID #	
1ST MALE'S NAME & TBF ID #		2ND MALE'S NAME & TBF ID #			
1ST MALE'S ADDRESS (Don't forget zip code and county)		2ND MALE'S ADDRESS (Don't forget zip code and county)			
ADDRESS (Don't forget zip code and county)		ADDRESS (Don't forget zip code and county)			

Figure 2: TBF Tag Card

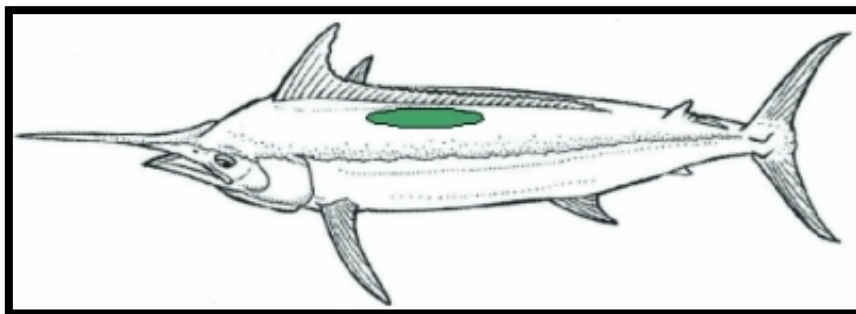


Figure 3: Proper tag placement location

and contact info. (Be sure your membership is current so you can get the quickest credit for your efforts.)
DO NOT USE THIS RELEASE CARD FOR TAGGED FISH. THIS CARD IS FOR NON-TAGGED FISH ONLY.

Date: / / (if carding) Location Lat °N Long °W
mm / dd / yyyy

Angler's Name & TBF ID #: Jr Angler? DOB: / /
Required for Youth Award participation

Angler's Address: Don't forget your zip code & country

Angler's E-Mail Address: Phone #: ()

Captain's Name & TBF ID:

Captain's Address: Don't forget your zip code & country Phone #: ()

Captain's E-Mail Address:

1st Mate's Name & TBF ID: 2nd Mate's Name & TBF ID:

Boat Owner's Name & TBF ID #:

Boat Name: Make/Model/Length

Enter in box # per species released: ☐ Black ☐ Blue ☐ Sailfish ☐ Spear ☐ Striped ☐ Sword ☐ White

INTERACTION: Lines in: ☐ A.M. ☐ P.M. Lines out: ☐ A.M. ☐ P.M. Total # of lines in: Circle
 Bolt: Live, Dead, Loose

Figure 4: TBF Release Card

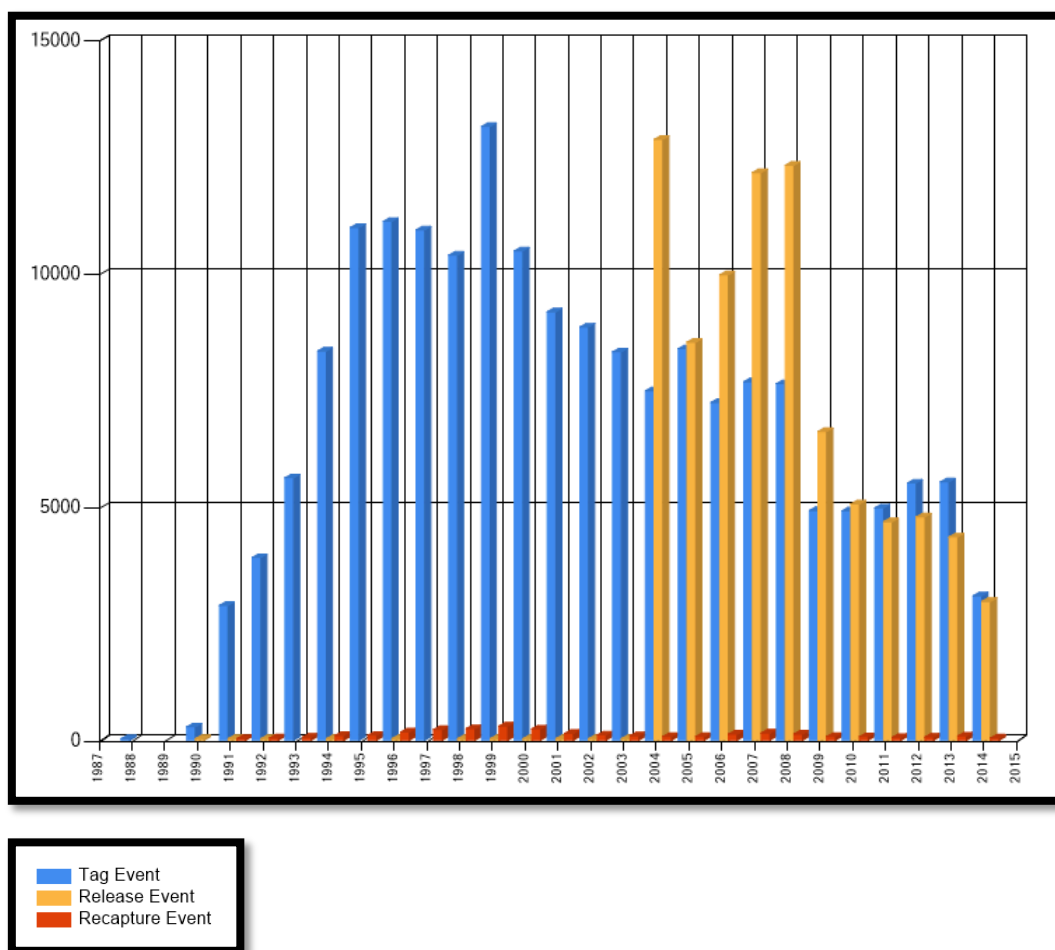


Figure 5: The amount of tag, release, and recapture events in the TROD as of August 2014. Data pulled from TROD's public Explorer section

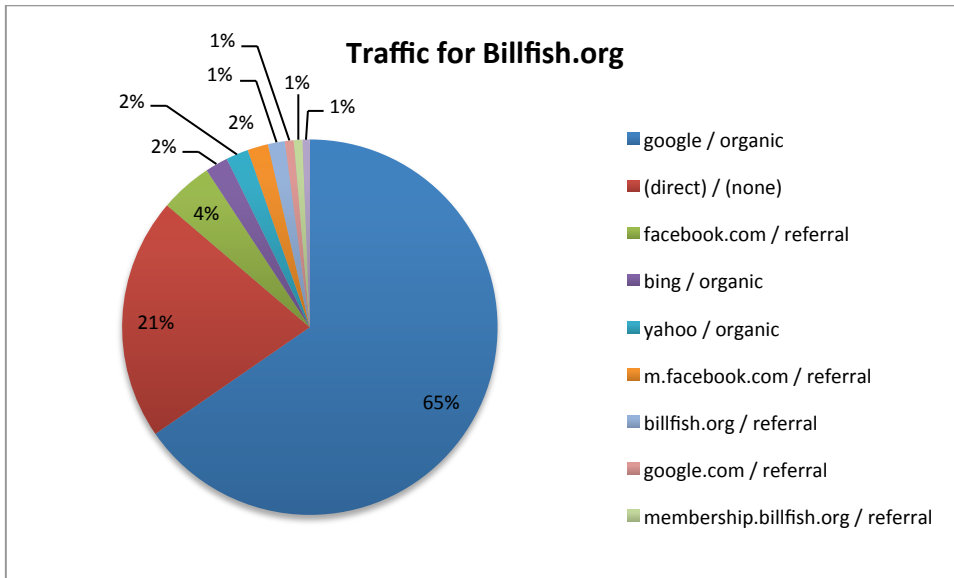


Figure 6: Traffic for the billfish.org site (Top 10 sources)

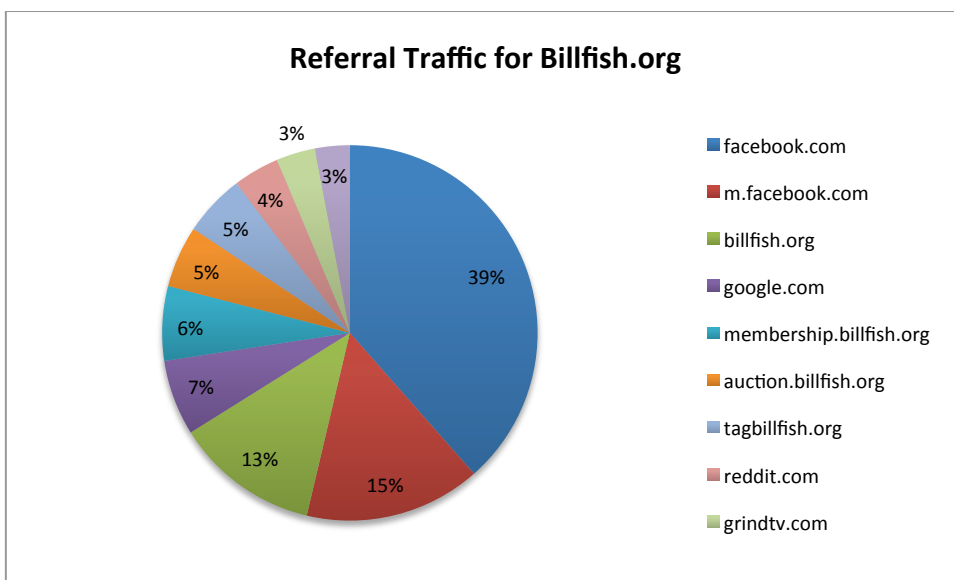


Figure 7: Referral traffic for billfish.org site (Top 10 sources)

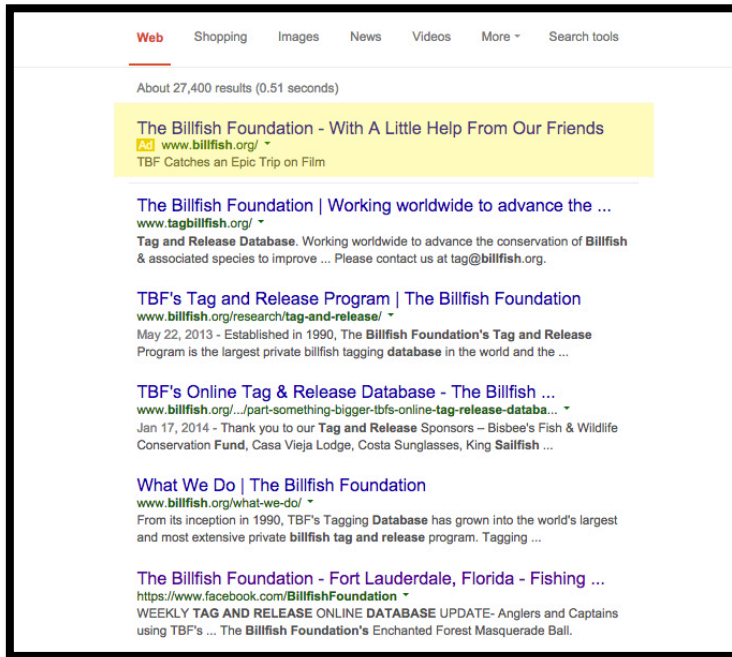


Figure 8: Screen shot example of Google Ad Words Ad

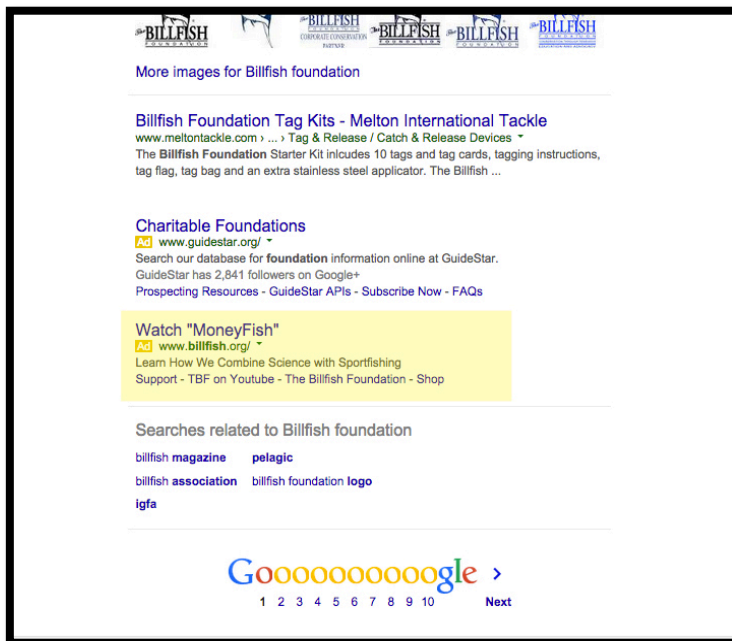


Figure 9: Figure 2: Screen shot example of Google Ad Words Ad

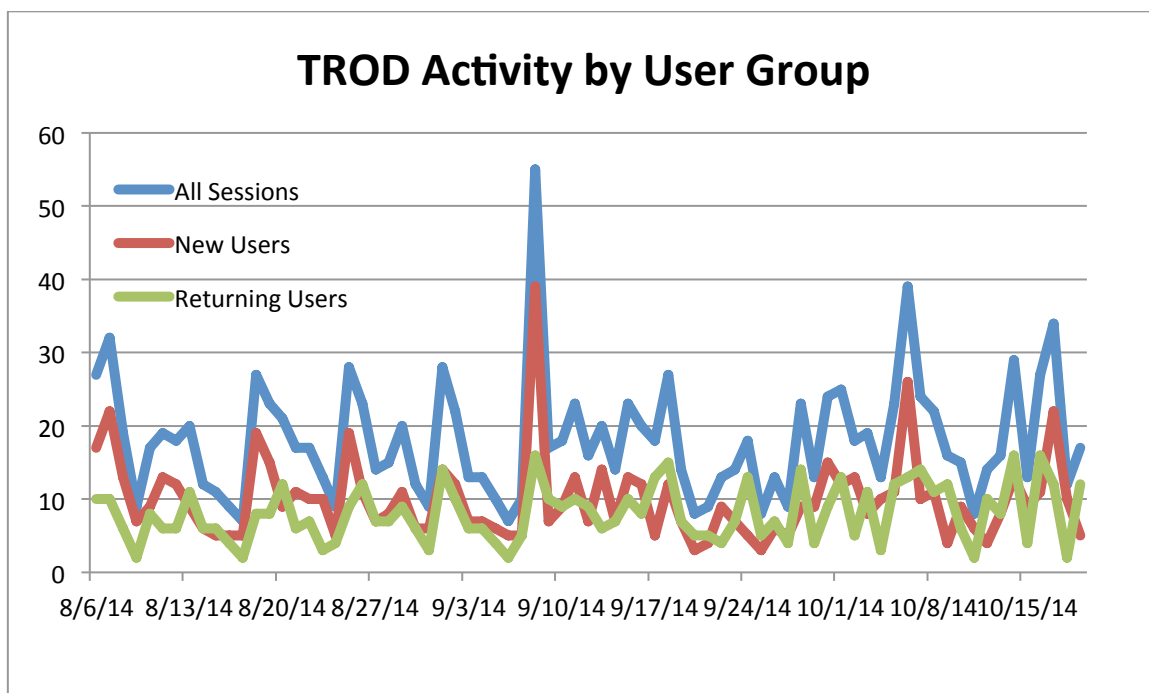


Figure 10: TROD activity for 75 days measured in sessions by new, returning, and all users

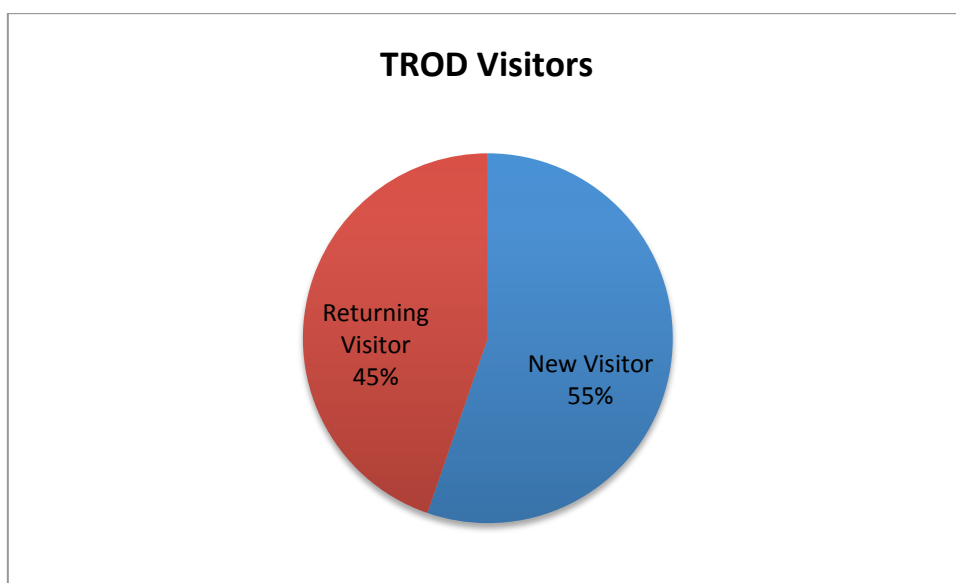


Figure 11: TROD new visitor vs returning visitor

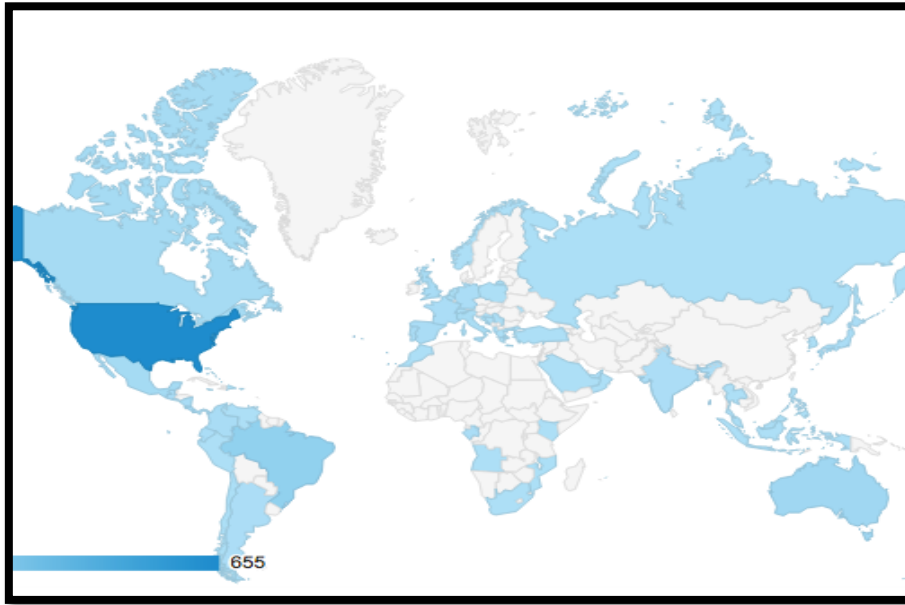


Figure 12: Sessions based on geographic location of users (Screen capture pulled from Google Analytics)

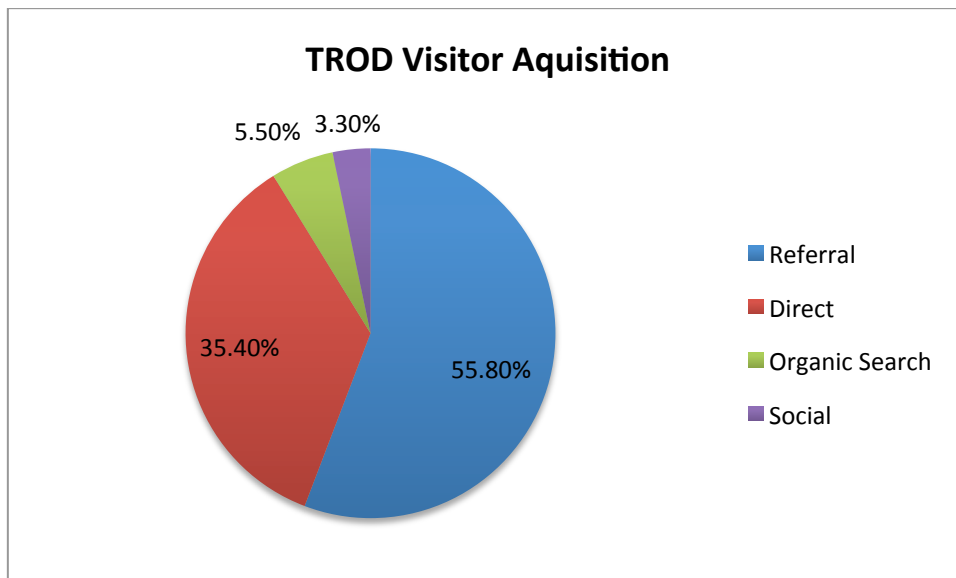


Figure 13: Visitor acquisition by source for all sessions

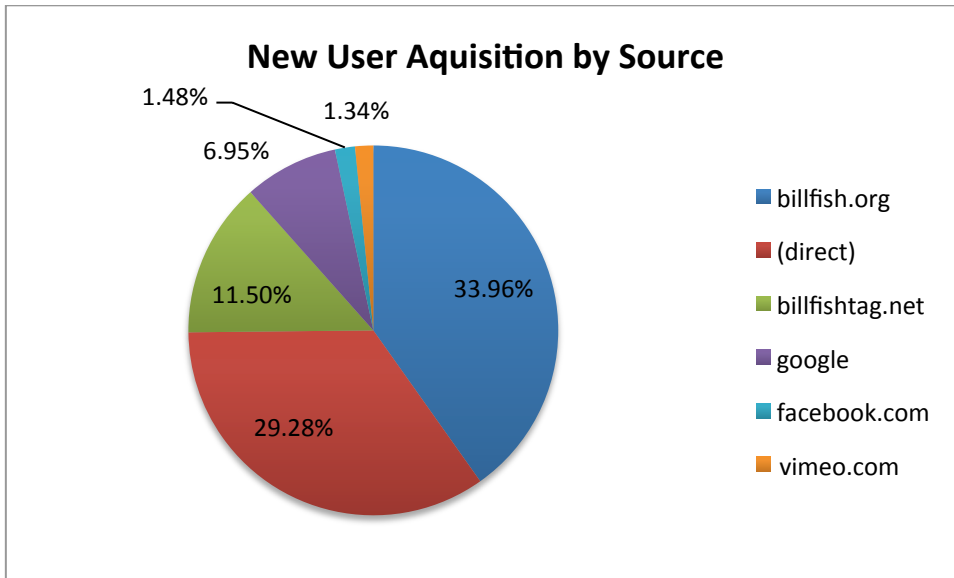


Figure 14: Top acquisition sources for all new users

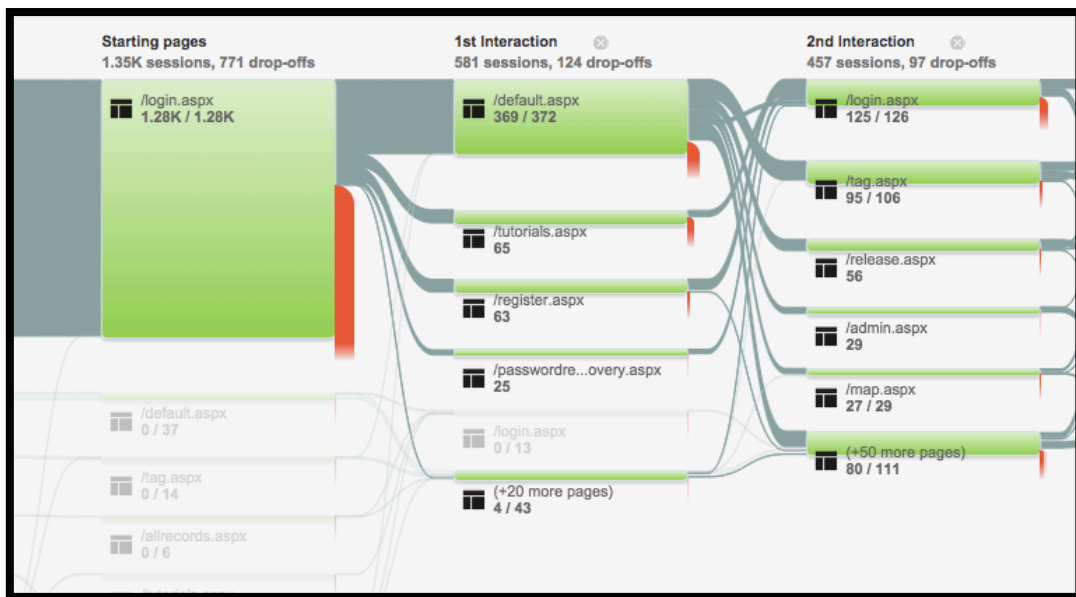


Figure 15: Google Analytics diagram indicating user flow on the Tag and Release Online Database

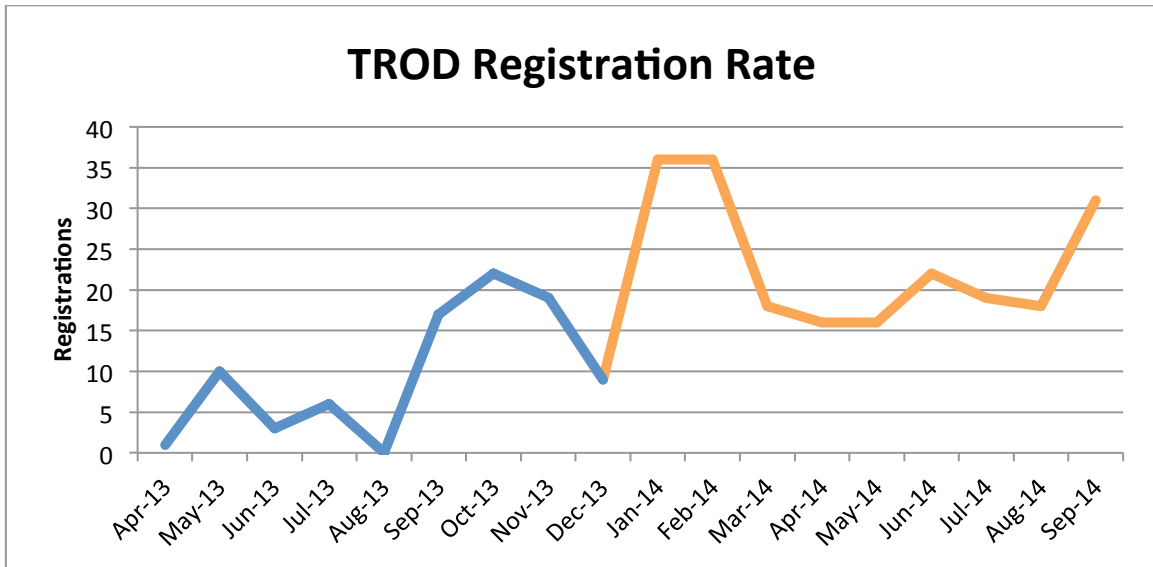


Figure 16: Initial (blue) and stimulated (orange) growth of the TROD based on registration rates

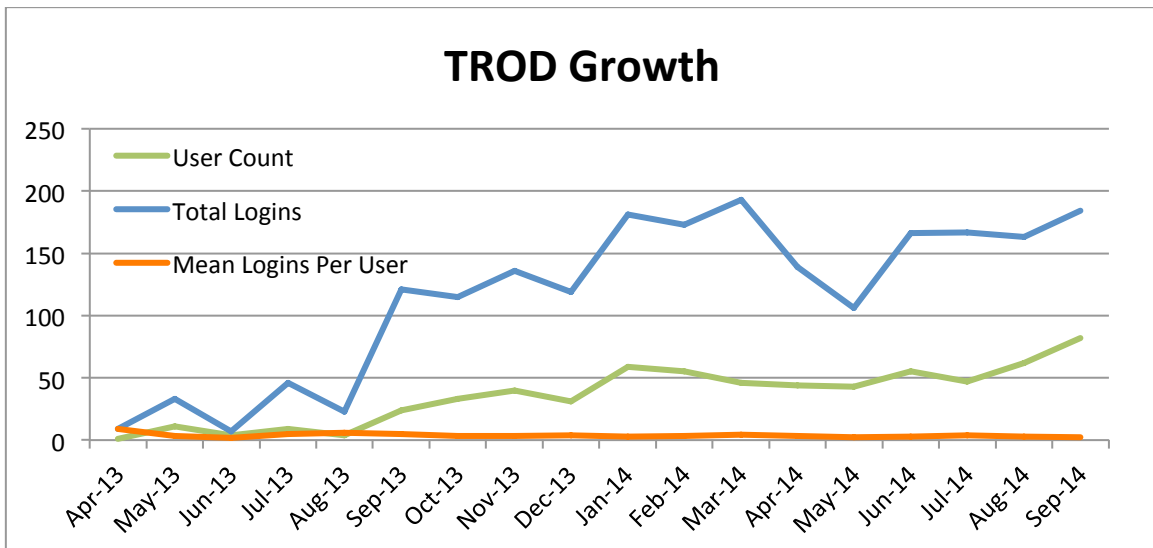


Figure 17: Initial and stimulated growth of the TROD based on the amount of users and number of logins

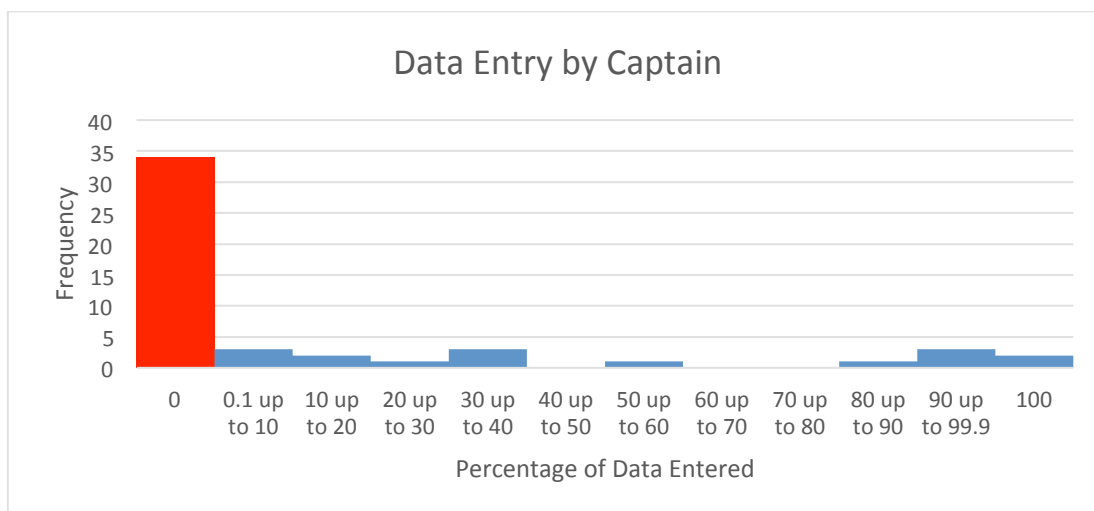


Figure 18: The population frequency and percentage of data entry by captains. Red indicates subset of population who entered nothing

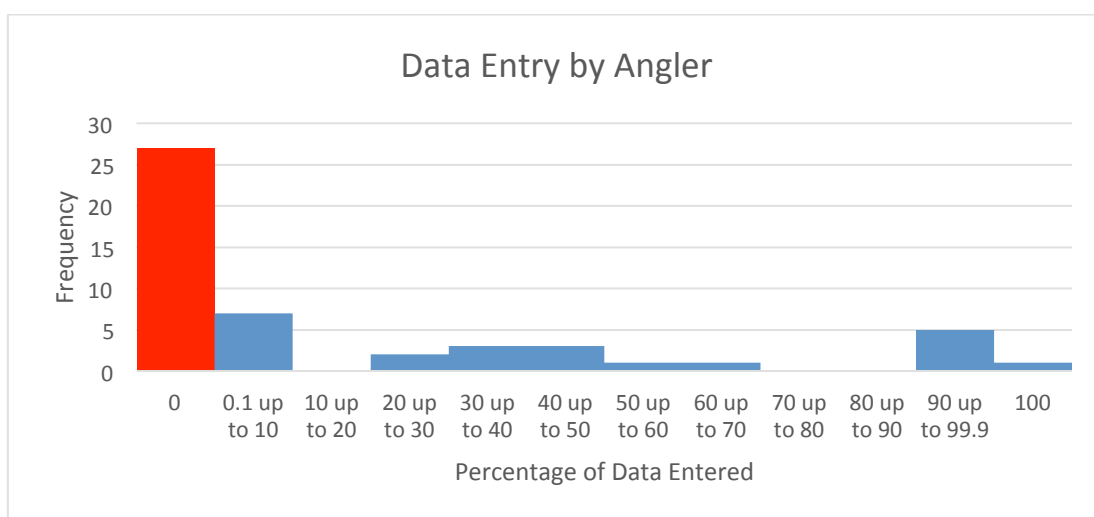


Figure 19: The population frequency and percentage of data entry by anglers. Red indicates subset of population who entered nothing

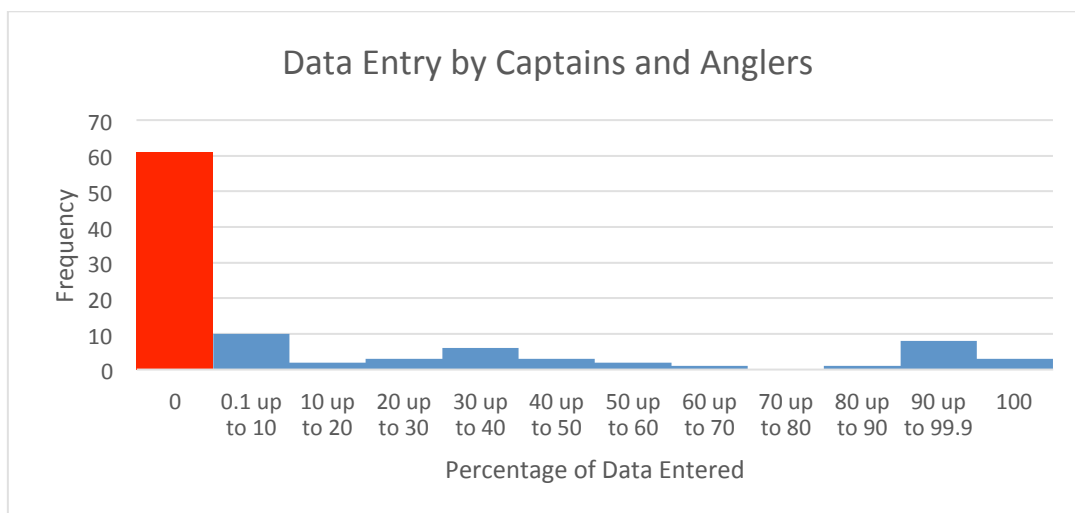


Figure 20: The population frequency and percentage of data entry by captains and anglers. Red indicates subset of population who entered nothing

Tables

Table 1. Locations of interviewed captains

State/County	Count
Florida, US	3
Guatemala	2
N. Carolina, US	1
California, US	1
Georgia, US	1
Hawaii, US	1
Costa Rica	1
W. Australia, AU	1
Gabon, Africa	1

Table 2. Locations of interviewed anglers

County	Count
New Jersey, US	2
Texas, US	2
California, US	2
Maryland, US	2
Georgia, US	1
Indiana, US	1
Florida, US	1
Queensland, AU	1

Table 3. Cost of services rendered over new campaign (January – September 2014, based on local averages)

Work Type	Hours	Average Local Rate (hourly)	Total Cost
Marketing Consultation	960	\$35.00	\$33,600.00
Video Production	100	\$70.00	\$7,000.00
Graphic Design	40	\$13.00	\$520.00
			\$41,120.00

References

- Assaad, W., and Gómez, J. (2011). Social Network in marketing (Social Media Marketing) Opportunities and Risks. *International Journal of Managing Public Sector Information and Communication Technologies (IJMP ICT)*, 2(1), 13-22. Retrieved February 24, 2014, from <http://airccse.org/journal/mpict/papers/0911ijmpict02.pdf>
- Casini, M., et al. (2009). Trophic cascades promote threshold-like shifts in pelagic marine ecosystems. *Proceedings of the National Academy of Sciences of the United States of America* 106:197-202.
- Chaibonsai, P., Meltzoff, S., Bogardus, D., Peel, E. (2008). A socioeconomic and biological assessment of a constituent-based tag data collection program. *Proceedings of the 61st Gulf and Caribbean Fisheries Institute*.
- DiNicola, D. (2013) *Tag and Release Online Database: Tutorial Series* [Short film]. United States: The Billfish Foundation
- DiNicola, D. (2014) *Get On Board* [Commercial]. United States: The Billfish Foundation
- DiNicola, D. (2014) *With a Little Help From Our Friends* [Short film]. United States: The Billfish Foundation
- DiNicola, D. and Chaibongsai, R. (2013) *Get Hooked* [Short film]. United States: The Billfish Foundation
- Ditton, R. B., and Stoll, J. R. (2003). Social and economic perspective on recreational billfish fisheries. *Marine & Freshwater Research* (54) 4:545-554.
- Evans, D. (2010). *Social media marketing the next generation of business engagement*. Indianapolis, Ind.: Wiley Technology Pub
- French, J. (2013). Developing the international consensus definition of Social Marketing. Retrieved February 5, 2014, from <http://www.aasm.org.au/wp-content/uploads/2013/07/AASM-Viewpoint-Vol-2-Issue-5-Professor-Jeff-French-Developing-the-international-consensus-definition-of-social-marketing.pdf>
- French, J. (2010). *Social marketing and public health: Theory and practice*. Oxford: Oxford University Press.
- Froese, R., and Pauly, D. (2012). "*Makaira nigricans*" in FishBase. March 2012 version.

- Gentner, B. (2007). Economic Analysis of International Billfish Markets: Executive Summary. Retrieved August 7, 2014, from http://www.takemarlinoffthemenue.org/files/PDFdocuments/Billfish_trade_imports_PDF_1108.pdf
- Google. (2014, January 1). What is Google Ad Grants? Retrieved January 1, 2014, from <http://www.google.com/grants/>
- Helfman, G., and Collette, B. (1997). *The diversity of fishes*. Malden, Mass.: Blackwell Science.
- Hilborn, R., Walters, C. J., and Jester Jr, D. B. (1990). Value of fish marking in fisheries management. *Am. Fish. Soc. Symp.* 7:5-7
- IGFA (2001). 'World Record Game Fishes.' (International Game Fish Association, Fishing Hall of Fame and Museum: Dania Beach, FL.)
- Jimenez, M., et al. (2010). Analysis of the Economic Contribution of Recreational and Commercial Fisheries to the Costa Rican Economy. University of Costa Rica. Retrieved August 7, 2014, from <https://www.igfa.org/images/uploads/files/CostaRicaMarineFisheriesEconomics5-30-10.pdf>.
- Katz, A. M. (2014) A qualitative analysis of billfish angling relative to tagging practices in the western Atlantic Ocean. Unpublished Manuscript
- Kitchell, J. F., et al. (1999). Keystone predators in the central Pacific. Pages 665-683 in *Ecosystem approaches for fisheries management*. University of Alaska Sea Grant, Fairbanks.
- Kitchell, J. F., et al. (2006). Billfishes in an ecosystem context. *Bulletin of Marine Science* 79:669-682.
- Lefebvre, R. C. (2013). *Social marketing and social change strategies and tools for health, well-being, and the environment*. San Francisco, CA : Jossey-Bass,.
- Lefebvre, R. C., and Ebooks Corporation. (2013). *Social marketing and social change: Strategies and tools for health, well-being, and the environment*. San Francisco, CA: Jossey-Bass.
- Lynch, P. D., Graves, J. E., and Latour R. J. (2011) Challenges in the assessment and management of highly migratory bycatch species: a case study of the Atlantic marlins. *Sustainable fisheries: multi-level approaches to a global problem*, 197-225
- Magnuson Stevens Fishery Conservation Act. Section 102

- Meyer, S., and Chaibongsai, P. (2012) *MoneyFi\$h – A Waterlust Film About Billfish* [Short film]. United States: The Billfish Foundation and Waterlust
- Miami International Boat Show. (2014, February 21). Miami Boat Show echoes rebound for industry. Retrieved February 26, 2014, from <http://www.boatingindustry.com/news/2014/02/21/miami-boat-show-echoes-rebound-for-industry/>
- Nakamura, I. (1985) Billfishes of the world. An annotated and illustrated catalogue of marlins, sailfishes, spearfishes and swordfishes known to date FAO Fisheries Synopsis, 125 (5). Rome.
- Nesrsta, N., personal communication, March 4, 2014
- O'Tool, J. (2014, February 28). Mobile apps overtake PC Web usage in U.S. Retrieved July 11, 2014, from <http://money.cnn.com/2014/02/28/technology/mobile/mobile-apps-internet/index.html>
- Ortiz, M., et al. (2003) Global overview of the major constituent-based billfish tagging programs and their results since 1954. *Marine and Freshwater Research*, 54, 489-507
- Pace, M. L., et al. (1999). Trophic cascades revealed in diverse ecosystems. *Trends in Ecology & Evolution* 14:483-488.
- Paine, R. T. (1969). A note of trophic complexity and community stability. *American Naturalist* 103:91-93.
- Prince, E. D., and Brown, B. B. (1991). Coordination of the ICCAT enhanced research program for billfish. In 'Creel and Angler Surveys in Fisheries Management'. American Fisheries Society Symposium 12, 13-18
- Schuett, M. A., et al. (2014) Anglers' Motivations for Volunteering with Fishing or Conservation Organizations, *Fisheries*, 39:7, 305-311, DOI: 10.1080/03632415.2014.924407
- Southwick, R., et al. (2008). The Economic Contributions of Anglers to the Los Cabos Economy. Retrieved August 7, 2014, from <http://www.billfish.org/wp-content/uploads/2013/05/TBF-Cabo-Economics-Report.pdf>
- Southwick, R., et al. (2013). Sportfishing in America: An Economic Force for Conservation. American Sportfishing Association. Retrieved April 1, 2014, from http://asafishing.org/uploads/2011_ASASportfishing_in_America_Report_January_2013.pdf

Taylor, S. J., and Bogdan, R. (1998). Introduction to qualitative research methods: A guidebook and resources (3rd ed.). New York: John Wiley & Sons

USDOC. (1999). Amendment 1 to the Atlantic Billfish Fishery Management Plan. U.S. Dep. Commer., NOAA, Natl. Mar. Fish. Serv. Highly Migratory Species Manage. Div. Washington, D.C.

Xiphias gladius. (2014) FAO, Species Fact Sheet. Retrieved August 7, 2014, from <http://www.fao.org/fishery/species/2503/en>

Appendices

Appendix A

Excerpts from the internal Messaging Source Document (MSD) Created for TBF

Core Positioning Matrix by Audience

This section highlights the differences in messaging between our four key audiences.

Key Messages by Audience	Angler Key Messages: • Visibility of catch and release records • Personalized and sharable fishing almanac • One stop website for fishing • Simplified reporting for tag and release program • Social media integration	Charter Captain Key Messages: • Visibility of catch and release records • Personalized and sharable fishing almanac • One stop website for fishing • Simplified reporting for tag and release program • Social media integration	Fishing Tournaments: • Visibility of catch and release records • Personalized and sharable fishing almanac • One stop website for fishing • Notoriety • Social media integration	Scientific Community: • Visibility of catch and release records • Personalized and sharable fishing almanac • One stop website for fishing • Ease of access for tag and release data • Social media integration
Problems this User is Facing by Audience	Strategic Angler Problems: • No visibility for catch and release records or payoff • Multiple sites to get information including forecasts • Antiquated tag and release reporting	Strategic Captain Problems: • No visibility for catch and release records • Multiple sites to get information including forecasts • Antiquated tag and release reporting	Fishing Tournament Problems: • No visibility for catch and release records • Lack of notoriety	Scientific Community Problems: • No visibility for catch and release records • Multiple sites to get information including forecasts • Antiquated tag and release reporting
Top Three Solution Benefits by Audience	Angler Benefits: • Visibility of catch and release records • Personalized and sharable fishing almanac • Simplified reporting for tag and release program	Captain Benefits: • Visibility of catch and release records • Personalized and sharable fishing almanac • Simplified reporting for tag and release program	Fishing Tournament Benefits: • Visibility of catch and release records • Personalized and sharable fishing almanac • Notoriety and positive PR	Scientific Community Benefits: • Visibility of catch and release records • Personalized and sharable fishing almanac • Ease of access for tag and release data

IV. Solution Messaging Themes

This section provides strategic solution messaging themes and descriptions for the complete benefits provided by the solution (Limit to 5).

Highlighted Strategic Messages

- **Experience data transparency within The Billfish Foundation's keystone Tag and Release Program.** A glaring issue with TBF's Tag and Release Program was that submitted data from volunteer constituents was not easily accessible for all third parties. Skepticism of the purpose and payoff of the data collection caused a decrease in tag and release card submissions in recent years. TBF's Tag and Release Online Database was created to allow users to see exactly what becomes of their data as well as interact with it on a personal level to galvanize further participation in the Tag and Release Program.
- **Become directly involved in conservation efforts with a more innovative, advanced, and personalized Tag and Release experience.** You can experience a website tailor-made to cater to your passion for billfishing. See how your tag and release efforts directly translate into advancements in billfish science. View recapture maps made possible by other volunteer anglers and see where and how far your fish traveled. My catch data keeps a complete record of all of your catches - including location on an interactive map. View accurate weather forecasts before you head out on the water with Buoyweather®.
- **Be a part of an engaging, user-driven community of like-minded individuals.** Through the database you can meet and converse with other anglers who are also passionate about billfishing. You can easily share your catches with friends and followers through social media integration. Use the database as a tool to help grow your business and draw in new customers who you can then teach about tag and release programs and how they can become involved.
- **Improve the efficiency of the Tag and Release Program by decreasing report times for catches.** Submitting your data through the database saves time and improves the efficiency of the Tag and Release Program. You can receive instant gratification and access to all of the options available without waiting for TBF to enter the tag and release data for you. Quicker entry also allows for TBF to use and analyze the data faster so that it can be applied to research and policy.
- **Develop a positive and active rapport within the conservation community.** By using the Tag and Release Online Database you can connect with members of the conservation community through social media outlets. Promote your business through and highlight the importance of TBF's Tag and Release program and its conservation goals.

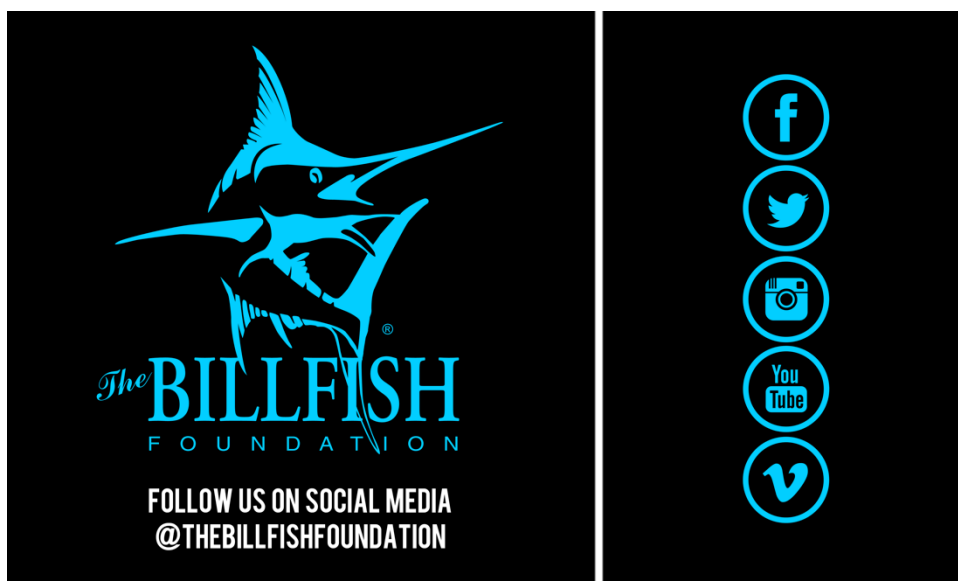
Strategic Messages & Solution Benefits

This section provides approved short descriptions (based on longer description above) of the Strategic Messages and the Key Concepts for the complete feature set of the solution. Please keep to the same 5 Strategic Features as above.

Strategic Messaging Theme	Strategic Solution Benefits
Experience data transparency within The Billfish Foundation's keystone Tag and Release Program.	Instantly inquire and retrieve data in real time. Users have access to all of the data within TBF's Tag and Release Program.
	Trusted and reliable data. The visibility and accessibility of all data allows for users to self-moderate the community and notify TBF in the event of any discrepancies.
Become directly involved in conservation efforts with a more innovative, advanced, and personalized Tag and Release experience.	View tag, release, and recapture records of billfish. See how far these mysterious fish travel and specifics on how they were caught. Learn how this information is vital in understanding how to create responsible management practices for billfish species.
	Seamlessly integrate your social media channels into your Tag and Release Database experience. Having the ability to share your catches provides you with provides unlimited potential to gain notoriety and converse with other interested parties as well as grow your business.
	Develop a personalized fishing almanac. Determine best fishing practices and effective strategies by examining all of your catch and release records.
Be a part of an engaging, user-driven community of like-minded individuals	Connect and engage with anglers from around the world.
	Share tips and tactics with other anglers
	Self gratification for being involved in a conservation organization
Improve the efficiency of the Tag and Release Program by decreasing report times for catches.	Streamlined and instantaneous data submission
	Receive faster benefits
Develop a positive and active rapport within the conservation community.	Connect with conservation groups and initiatives

Appendix B

Postcards created during the campaign



Appendix 3

Interview Guide

Interview Questions

1. Name and location
2. How long have you been billfishing?
3. What attracts you to billfishing over other outdoor activities?
4. Do you actively use social media sites like Facebook, Twitter, and Instagram?
5. Age?
6. How long have you been involved with TBF's Tag and Release Program?
7. Why do you participate?
8. Have you heard of TBF's Online Tag and Release Database
 - a. If so where/how?
9. Have you utilized it in any way? (All that apply)
 - a. Enter tag and release cards
 - b. Explore data
 - c. Check weather reports
 - d. Other (examples)

If yes to 9...

10. How often do you use it and for what reason?
11. What do you like about it most?
12. How can it be improved? Would you recommend it?
13. TBF is currently developing an app for the database, would you use this method of tagging and reporting more than a computer or traditional postage?

If no to 9...

14. What could have been done to engage you?

If no to 8...

The Billfish Foundation's Online Tag and Release Database is the largest private billfish tagging database in the world providing scientists with vital information gathered by thousands of volunteer fishing teams. It allows for users to personally enter and keep an easily accessible log of all of their tagged and released fish. Users can explore and search for specific catches from around the world and compare them to their own catch history; investigate up to the minute weather forecasts provided by Buoyweather®; and share video, photos, and records of catches to their social media profiles.

15. What would be the best way to reach and inform you in the future? (Circle all that apply)
- a. Facebook
 - b. Twitter
 - c. Email,
 - d. Website,
 - e. Magazine,
 - f. Other (what?)