



Full length article

# Characterizing information on best practice guidelines for catch-and-release in websites of angling-based non-government organizations in the United States



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## ABSTRACT

Recreational catch-and-release angling is an important tool for managing fish stocks. As recreational fishing is often a culturally or community-based activity, many anglers look to local grassroots and other non-government organizations (NGOs) as a source of information regarding their angling practices. For this study we examined the websites of recreational angling NGOs for mention of conservation and availability of best practice guidelines for catch-and-release fishing. Based on combinations of twelve search terms used on the Google search engine between October 2014 and March 2015, we reviewed 183 NGO websites and evaluated the language used in mission statements and website content for mention of conservation, catch-and-release, and any details related to the handling of caught fish. Any posted guidelines for catch-and-release were compared against scientifically evaluated best practices. During the time of our survey, results showed that <9% of recreational fishing NGOs mentioned catch-and-release anywhere within their websites and almost none provided complete, accurate best practice guidelines. For the small number of websites that did mention or promote guidelines for catch-and-release, there was no difference in the frequency of best practices listed among NGOs that focused on fly fishing, conventional gear fishing, or both. NGOs with a large membership shared more best practice guidelines for catch-and-release on their websites. Whether voluntary or mandatory through regulations, if catch-and-release is to be a valuable tool for conservation, our results suggest that there is a need for greater emphasis on encouraging best practices guidelines to be shared across a broad range of angling based NGOs. Knowledge sharing among angling based NGOs could be an effective way to promote best practices guidelines that ultimately help support the sustainability of recreational fisheries.

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## 1. Introduction

In recreational fisheries it is estimated that as many as 47.1 billion fish are caught worldwide each year, with over 60% being released (Cooke and Cowx, 2004, 2006). Fish are released because it is mandated through regulations or voluntarily based on a growing conservation ethic within the recreational angling community (Arlinghaus et al., 2007). The desired outcome of catch-and-release is that the fish will survive their capture and handling, and subsequently be returned to the water as fit individuals to contribute to the future of the population (Cooke and Suski, 2005). If fitness is greatly reduced or post-release mortality extensive, then the value

of catch-and-release as a conservation tool for recreational fisheries can be compromised (Cooke and Suski, 2005).

Over the past few decades there has been a growing number of scientific studies focused on quantifying the potential impacts of catch-and-release fishing (Cooke et al., 2013). These studies have identified that the capture, handling, and release of fish can result in physical injuries, physiological stress, behavioral impairment, and short-term post-release mortality (reviewed in Muoneke and Childress 1994; Arlinghaus et al., 2007). Some studies have also revealed that catch-and-release can indeed have an impact on individual fitness (e.g., Richard et al., 2012). Based on the suite of potential impacts, general and species-specific guidelines can be used to reduce the negative effects of capture and handling when recreational anglers are interacting with their catch (Cooke and Suski, 2005).

Disseminating accurate best practice guidelines for catch-and-release fishing to the recreational angling community is essential

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for the adoption and effectiveness of this conservation tool (Arlinghaus et al., 2007; Cooke et al., 2013). The recreational angling community is diverse, as are the preferred modes for receiving information on responsible angling techniques, yet the Internet is increasing in popularity as a source of information for recreational anglers (Nguyen et al., 2012). Almost a decade ago, Pelletier et al. (2007) surveyed the websites of state and provincial government agencies in the United States and Canada to assess the presence and accuracy of best practices guidelines. These websites were largely frequented by anglers for the purpose of renewing their fishing licenses, and therefore had a far-reaching audience. They found that there was great variation in the information available in these websites, and that there was a large presence of misinformation about putting catch-and-release into practice (Pelletier et al., 2007). In fact, some posted guidelines for catch-and-release could be deleterious to fish (Pelletier et al., 2007). Although state and provincial government websites have likely evolved since the time of the Pelletier et al. (2007) study to include accurate best practice guidelines for catch-and-release fishing, government agencies are likely not the only source of such information for recreational anglers.

Clubs, associations, and grassroots organizations are relatively common within the recreational angling community, and many of these groups have a presence on the Internet. Given the accessibility of these non-government organizations (NGOs) online, their websites could prove to be a source of information for recreational anglers interested in learning about conservation and best practices for handling and releasing fish. However, to date, there has been no assessment as to the conservation messaging in the websites of angling-based NGOs, including the conveyance of guidelines for catch-and-release fishing.

The purpose of our study was to examine the presence and accuracy of best practices guidelines for catch-and-release recreational fishing on websites of angling based NGOs in the United States. Although the Internet is a global network, we limited our search to NGOs based in the United States to avoid issues with language translation and potential cultural differences, yet we did include organizations based in the United States that intentionally intended to have a global reach. We acknowledge that our study was a snapshot in time and that the addition and attrition of angling-based NGO websites may have occurred since the time of our survey. Given the relative ease of changing material presented on websites, we also acknowledge that websites that still persist since our survey could have changed their content. Nevertheless, we hope that our study does reveal important trends in the communication of conservation information emanating from angling-based NGOs, especially information related to catch-and-release fishing.

## 2. Materials and methods

### 2.1. Website searches and filtering

Due to the widespread use of the Internet as a means of finding and distributing information, we focused on websites for NGOs as a representation of the information they are openly informing the public. To gather websites, we used the Google search engine between Oct, 2014 and March, 2015. We surveyed the first 100 sites provided by Google for each of twelve search terms. Search terms included combinations of the terms “angler,” “fishing,” and “angling” with “organization,” “organisation,” “club,” and “association.” Websites were only used for the study if they represented NGOs based in the United States, and were directly accessible by one click from the Google results page (i.e., we did not include websites that were embedded as links in other sites). From these 1200 search results, we eliminated websites that: did not represent

grassroots-style groups of anglers, were property- or clubhouse-based, were primarily focused on retail, were members of a larger organization or group that had a broader mandate than fishing, and, did not provide enough information to enable us to conduct the content analysis. We then conducted a second filter of the remaining websites by reviewing their mission statements to determine if the organizations met our criteria. This filtering process left us with the websites used for our detailed analyses.

### 2.2. Best practices evaluation

The information recorded from each website included a link to the webpage, the nation/state/region that hosts the organization, the organization’s mission statement, whether or not it was based on members, anglers, tournaments, conservation or education, if the NGO was species-specific, and whether or not catch-and-release was mentioned at all on the website. Any content relating to catch-and-release practices, including pictures and diagrams, was reviewed and assessed for accuracy based on 12 criteria compiled using information from scientific studies and review papers (Table 1; Gilmour, 1997; Muoneke and Childress, 1994; Cooke and Suski, 2005; Pelletier et al., 2007; Wilde, 2009; Cooke et al., 2013). For each website that mentioned catch-and-release fishing, the 12 criteria were given a score of ‘0’ if they were not mentioned or incorrectly defined, and a ‘1’ if they were mentioned and adequately explained. Any language that encouraged practicing catch-and-release fishing was also recorded. The evaluation of websites was conducted by the same investigator to ensure consistency in judging criteria, and a random selection of 20 websites were reevaluated at the end of the survey to examine for surveyor drift.

For the websites surveyed, we examined regional patterns since the motivations to convey guidelines for catch-and-release fishing could be linked to social norms related to target species and predominant type/mode of fishing. For this, based on the origin indicated, websites were divided into six categories based on the division of regions by the U.S. Census Bureau: U.S. based with international scope, U.S. (national scale), Midwest (U.S.), Northeast (U.S.), South (U.S.), and West (U.S.). A Chi square test was then used to compare the distribution of NGOs by region. For those websites that did mention best practices for catch-and-release fishing we compared the number of best practices mentioned by the fishing type the NGO promoted (conventional tackle fishing, fly fishing, or both) using a Kruskal-Wallis test. All statistical tests were conducted using JMP Pro 12.1.0 (SAS Institute, Cary, NC, USA) and the level of significance ( $\alpha$ ) for was 0.05.

## 3. Results

From the 1200 websites we reviewed, the filtering process identified 183 organizations that fit our NGO-based criteria. Of these 183 organizations, over 57.9% ( $n = 106$ ) mentioned conservation in their websites, and only 8.7% ( $n = 16$ ) mentioned best practices for catch-and-release fishing. Of the 16 sites that referenced best practices for catch-and-release fishing, seven mentioned more than three of the 12 guidelines presented in Table 1. None of the websites mentioned all of the 12 best practices; the greatest number of best practices presented by any NGO was nine presented by the International Federation of Fly Fishers, followed by the International Game Fish Association and Farmington River Angler Association that each listed six of the best practices. The remaining 13 NGO websites included between 1 and 5 of the 12 best practices for catch-and-release fishing used in our survey. For the relatively small number of websites that included any best practices for catch-and-release fishing, there was no difference in the frequency of best practices listed among those NGOs that promoted fly fishing, conventional

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