



How Twitter Literacy Can Benefit Conservation Scientists

While some scientists may view Twitter as a social media fad, we argue that it can be a powerful tool to deliver conservation messages to a wide audience. In 2011 and 2013, the Society for Conservation Biology (SCB) Marine Section supported one of this editorial's co-authors (D.S.) as a communications fellow to share research in conservation science and practice that was presented at SCB's International Congress for Conservation Biology (ICCB) and to track the online conversations associated with each meeting. What he found was a worldwide audience thirsty for the knowledge presented and eager to participate in the proceedings.

The use of Twitter at the 2011 and 2013 ICCB meetings highlights the important role that social media can play in sharing conservation messages far beyond the confines of the conference halls. There were 1731 conference-related posts (i.e., tweets) with the official hashtag #ICCB at the 2011 meeting in Auckland, New Zealand. These tweets were typically short summaries (limited by Twitter to 140 characters) of conference presentations or paraphrased statements of particular note from presenters who were acknowledged by name in the tweet. Tweets and retweets (sharing of a tweet written by another user) with the #ICCB hashtag were made by a minimum of 176 unique tweeters (i.e., Twitter users) from at least 40 countries on 6 continents (Shiffman 2012). While the 2011 conference was attended by more than 1000 scientists from 80 countries, fewer than 10% of the tweeters actually attended the meeting (Shiffman 2012), showing that Twitter facilitated a truly global conversation about the information presented at ICCB 2011. The rate of tweeting at ICCB 2011 was considered high compared with other academic meetings and it was estimated that between 110,000 and 150,000 Twitter users saw at least one conference-related tweet (Aaron Muszalski in Shiffman 2012).

Twitter continued to be influential at the 2013 ICCB meeting in Baltimore, Maryland. Over 1500 scientists and conservation practitioners attended the 2013 meeting and the number of unique tweets nearly doubled to 3217, roughly an 85% increase over ICCB 2011. A minimum of 427 unique users tweeted or retweeted at least one #ICCB2013 tweet, again a significant increase from the previous meeting. As with the 2011 meeting,

approximately 90% of these users were not present at the meeting, participating instead in online conversations about conservation. Offsite participants could even interact directly with speakers—questions asked on Twitter could be relayed to the presenter and the answers then tweeted back to the Twitter community. At the 2011 ICCB, more than 50 questions from Twitter users on five continents were asked at just one panel session (Shiffman 2012), and “several panelists confided that they got more challenging and more interesting questions from Twitter than from the ICCB attendees in the room” (Shiffman 2012: 260).

To further encourage the use of Twitter, presenters at the 2013 ICCB were asked to provide a tweetable abstract of their presentation (i.e., a summary in 140 characters or less). For example, “U.S. wind turbines kill 45,000–644,000 birds per year; taller turbines kill more birds, and diurnal raptors are disproportionately affected” (S. Loss, see Supporting Information for more examples). These abstract tweets provided the main conclusions or the key take-home message of a presentation in a way that could be easily understood and demonstrated that it is possible to communicate conservation science in a concise but also extremely effective way. However, many conference participants were unsure about what a Twitter abstract was meant to accomplish. The majority of submitted abstract tweets were shortened, slightly rewritten or repeated versions of the talk title. Others included overly technical scientific jargon, used superfluous hashtags, or exceeded the character limit. While any engagement is better than no engagement, these tweets were impractical, duplicative, or less accessible to the public. In contrast, well-crafted tweetable abstracts provided useful sound bites with which to communicate research. We hope future ICCB meetings will continue to encourage submission of tweetable abstracts and provide guidelines for presenters. For example, the most effective Twitter abstracts would start with the author's surname, include one or two links to hashtag topics or websites, and finish with the conference hashtag. These abstracts can then be posted online in advance of the meeting and at the beginning or conclusion of each individual talk to disseminate the author's perspective and encourage online discussions.

We believe that the benefits of Twitter for conservation outreach extends beyond the conference center. Compressing ideas into 140 characters forces one to provide a clear message. It is effectively the ultimate elevator pitch and may be the sound bite that appeals to a journalist or politician. An added benefit of Twitter, as noted above, is the ability to share one's pictures (perhaps an inspiring photo or a graph) and links to the latest research findings or relevant websites. Darling et al. (2013) demonstrated that tweeting about a paper increases the social and scientific impact of the research. For example, papers published in the *Journal of Medical Internet Research* that are highly tweeted are also 11 times more likely to be highly cited (Eysenbach 2011). Papers mentioned on Twitter in the preprint database arXiv.org are associated with more downloads and early citations than less tweeted papers (Shuai et al. 2012). One of us (E.C.M.P.) tweeted a link to a new online early publication (Parsons 2013) in a journal and within 2 days the article was listed as one of the journal's most downloaded articles. Four months later the article was still in the top 5 most downloaded articles. Interested to see whether it really was Twitter that caused such a leap, he tweeted a second article from the same journal and within a day it too was listed within the top 5 most downloaded articles.

It is clear that Twitter can give one a voice in online conversations about conservation. But who is using their voice to support conservation? At present, many environmental NGOs have a Twitter presence, including the World Wildlife Fund (@WWF), the Wildlife Conservation Society (@TheWCS), Conservation International (@ConservationOrg), and The Nature Conservancy (@nature_org). Several conservation and applied science journals are also on Twitter, including *Conservation Biology* (@ConBiology), *Conservation Letters* (@ConLetters), *Conservation Evidence* (@ConservEvidence), and the *Journal of Applied Ecology* (@JAppliedEcology). Furthermore, many professional societies are beginning to embrace Twitter, including the Society for Conservation Biology, which has several diverse Twitter accounts linked to the global society (@Society4ConBio), the Marine Section (@SCBmarine), the Latin America and Caribbean Section (@LACA.SCB), the Social Science Working group (@SCB.SSWG), and several chapters (e.g., Missouri [@MissouriSCB] and Sydney [@SydneySCB]). The SCB has also recently approved a new Social Media Committee to encourage and support the use of social media platforms.

Conservation scientists are starting to share their research findings over Twitter, cultivating an audience for their scientific research. Darling et al. (2013) identified 116 marine scientists who actively tweet, a conservative estimate to be sure because many scientists may tweet under pseudonyms and more are joining Twitter every day. The majority of those Darling et al. (2013) identified are academic scientists affiliated with universities (84%),

but scientists from NGOs and government agencies are also tweeting. They also found that these scientists typically have a Twitter following that is over seven times larger than each scientist's academic department (Darling et al. 2013). When they examined the followers of the four authors in Darling et al. (2013), they found a diverse group that included students, academic, government and NGO scientists, scientific journals and organizations, the general public, and even journalists (Darling et al. 2013). In fact, a valuable benefit of using Twitter is the ability to access the large number of journalists who use Twitter to track cutting-edge and reportable scientific research. Another important group of influential Twitter users are politicians and decision makers. For example, all members of the U.S. House of Representatives and the Senate, as well as three-quarters of Canada's Members of Parliament have Twitter accounts (Darling et al. 2013). While senior policy makers may not always read tweets or interact on Twitter, their staff will in order to communicate and engage with voters. Accordingly, Twitter can provide a platform for scientists to directly reach decision makers (or their staff) with conservation messages.

Engaging with Twitter can be a powerful way for conservation scientists to reach journalists, policy makers, and the general public. We wholeheartedly encourage more scientists to sign up and start conversations with these audiences on Twitter. You can learn about getting started with Twitter from many scientists (like us!) who are already using Twitter to share their conservation science. Everyone can give their work a voice on Twitter, and quite a loud voice at that. Conservation science on Twitter does more than tweet, it roars.

Supporting Information

Examples of some comprehensive and effective Twitter summaries (Appendix S1) are available online. The authors are solely responsible for the content and functionality of these materials. Queries (other than absence of the material) should be directed to the corresponding author.

Table 1. Examples of effective Twitter summaries submitted to the 2013 ICCB meeting.

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