

Make Your Science Go Further with Standard Procedures!

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A pre-underway checklist is now standard operating procedure for most vessels. This detailed checklist requires mariners to ensure all emergency equipment is on board, all navigation equipment is in working order, and all essential tools for the voyage are present before the ship leaves port. But this was not always a requirement. David Blair was Second Officer on a ship that travelled from an Irish port to an English port. He left the ship before it was going to cross the Atlantic Ocean and either took with him the key to the cabinet containing binoculars for the ship's lookouts, stowed the binoculars in his cabin, or took the binoculars, which were originally his, off the ship (Scarth 2009). A standard pre-underway check was not used to ensure this important piece of safety equipment was present before the voyage, and the result was that no binoculars were available for the lookouts. The lookouts were told they would have to rely on their eyesight alone for the ocean crossing. Later, when one of the lookouts, Frederick Fleet, provided testimony at inquiries made by both the United States (Committee on Commerce, United States Senate 1912) and Great Britain (British Wreck Commissioner 1912) he reported that having a pair of binoculars would have helped him sight an iceberg sooner, in his opinion, giving the ship, the RMS *Titanic*, time to avoid the collision that ultimately sank her.

Standard procedures are important for industry, science, and medicine and are being increasingly used. Few of us would expect a physician to measure cholesterol or blood pressure differently between one patient and another, or among physicians. Henry Ford's standard assembly line procedures revolutionized automobile production and put an affordable automobile in the hands of most Americans. Weather maps would be a jumble of incoherent information if data were not collected in a standard manner across large regions.

Standard procedures are also important for fisheries biologists. They are becoming increasingly used for data collection as management strategies are being employed across larger regions, or time series data is critically needed for discovery and management of long-term effects of biodiversity loss, angling regulation effects, or changes due to climate shifts. They have been used to provide common treatment procedures for fish diseases, so fish pathologists can employ generally accepted cures and can contribute to a database of the effects of particular treatments. They have improved communication by standardizing names of fishes, so everyone can use a common nomenclature. Furthermore, following a well-accepted standard procedure can reduce challenges to biologists when litigation occurs, or can save their lives when a vessel is in distress.

Like other professions, the costs of non-standardization in the fisheries profession can be considerable. I have personally

had graduate students or employees examine historical data, or data gathered across wide geographic areas by agencies. Invariably, we have had to throw away most of the data because it was collected using a variety of different methods, making it almost impossible to compare.

Although standardization can improve many processes, not all are suitable for standardization. Sometimes research studies are conducted using new techniques that have not yet been standardized. Sometimes a variety of angling experiences is desired, and one standard regulation does not fit all situations. Standardization is often best for routine tasks, tasks involving safety, tasks requiring speed, and tasks given to new employees unfamiliar with a subject, among others.

Standardization of any procedure can be difficult to initiate, because of inertia built up by individuals over time who complete a task in ways that differ from the proposed standard. These individuals often resist. However, once underway, standardization can become quite popular. I am a project lead for standardizing fish survey methodologies in North America and queried state fish chiefs across the United States and Canada and book purchasers as to whether they were using the procedures recommended in AFS's 2009 edition of *Standard Methods for Sampling North American Freshwater Fishes* (Bonar et al. 2009). Of 120 respondents, 95% were using these standards at least sometimes, with 60% most of the time or always. Ninety percent of respondents reported these standard methods worked moderately to extremely well.

As a service to members and to the profession, the American Fisheries Society is now developing procedures to help the membership decide what fisheries tasks need standardization and what procedures can be used by AFS to develop future standard methods. The committee is now working on its recommendations, which we hope will be available sometime next year.

Furthermore, several existing standard methods are being updated. A second edition of *Standard Methods for Sampling North American Freshwater Fishes* is being updated using grants from the AFS Fish Management Section and the Association of Fish and Wildlife Agencies through a vote from fisheries chiefs across the United States. Similarly, an update of the *Blue Book* (AFS-FHS 2014), which gives standard methods for diagnosing and treating fish diseases, was also supported by the Association. Both projects are planned for completion within the next 2 years.

As a member, you can support increased use of standardization in suitable areas of fisheries science and management. Use standard methods where you think they may be applicable. Experiment with fisheries professionals in other jurisdictions to understand how standard data collection may give you more information for management decisions. Consider

how standards might be improved and suggest these to the originators of the standards. Think about how standards might be developed in your particular area of interest.

One can never be sure if David Blair's binoculars, in the hands of RMS *Titanic* lookout Frederick Fleet, would have given the crew the few more precious moments needed to avoid the iceberg. However, those binoculars would have been placed in his hands had there been a well-thought-out standard checklist. In the end, the horrible sinking of the *Titanic* gave way to standards of vessel operation so common that we take them for granted today. These include standard lifeboat numbers, standard numbers of personal flotation devices, standard 24-h shifts for communication operators on board, and a standard process to consider further improvement of marine vessel procedures and construction all over the world. These standards are now known as the International Convention for the Safety of Life at Sea. Standards have truly improved our interactions with the watery portion of our planet, and they will continue to improve our interactions with the animals and plants that live in it!

The opinions and tips given here, like all my columns, are mine and do not necessarily represent AFS or my employer.

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