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## Managing change in fisheries: a missing key to fishery-dependent data collection?

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Change is an important feature of commercial fisheries; yet the fishing industry, including fishers, fishery management authorities, and other stakeholders, is, in many respects, highly resistant to change. Examples of this include the application of conservation engineering solutions to bycatch problems and transitions towards ecosystem-based fishery management. A key reason for this resistance may be conditioning, cultural conservatism, and uncertainty. Change is often considered uncontrollable and unpredictable and a threat to established processes and systems that forces individuals to face an unknown future. In the business world, many models of change management have been applied to assist individuals and corporations in responding to an ever-changing environment. While fragments of these models have been applied in a fisheries context, the deliberate application of entire models has not. The application of these models could help to improve many aspects of fishery-dependent data collection such as using fishery-dependent information in stock assessment, implementing technologies such as vessel monitoring systems and electronic logbooks, and sharing information that is traditionally not shared. We present a well-known model for change management and describe how its application in a fisheries context can guide change initiatives and produce enhanced outcomes. We also explore how *competing commitments* and *big assumptions* influence a fisher's resistance to change, including conservation engineering initiatives, and posit how this can influence their involvement in the collection of fishery-dependent data.

**Keywords:** big assumptions, change management, competing commitments, conservation engineering, fishery-dependent data, Kotter.

### Introduction

In commercial fisheries, the conservation and protection of fish stocks requires control over harvesting levels in response to variation in stock abundance. Fundamental to this approach is that change is unavoidable, and as stock abundance changes in response to environmental change, the fishing industry, including fishers, fishery management authorities, and other stakeholders, will respond in a timely and effective manner.

Change is, therefore, an important feature of commercial fisheries, both in developed and developing countries, and irrespective of gear type. However, in many respects, the fishing industry can be characterized by resistance and a slow rate of change. For example, fishers have often applied similar fishing practices for many years,

using similar materials and harvesting techniques in well-established fishing grounds, processing their catch using traditional methods, and being passive recipients to the vagaries of landed prices. Often steeped in tradition and highly independent, many fishers view change with trepidation, suspicion, and scepticism. They may also view change as a threat to established processes and systems because it forces them to face an unknown future, as a threat to their financial wellbeing, and especially in developing countries, as a threat to their food security. It is not surprising, therefore, that the acquiescence of fishers to change is often achieved unenthusiastically, even if the benefits of doing so are clear.

Fishery management authorities often work in a conservative environment guided by a plethora of systems and protocols, where

change is guided by decision-making that is restricted to safe, narrowly focused, and political mandates. Avoidance of litigation may contribute to this environment by retarding the development of a culture of responsiveness and the narrow application of the precautionary principle. Change may also be influenced by departmental “silos” that hamper regular and effective cross-communication or collaboration between individuals, particularly if there is competition for limited recognition or resources.

Scientists, environmentalists, and other stakeholders are often mired by their own political mandates and agendas, limiting their focus to their own ambitions, goals, and sphere of immediate influence, especially if reliant upon sources of funding that are tied to narrow goals and objectives. These individuals may also be guided in their actions by well-entrenched and seemingly intractable perceptions of the behaviour, trustworthiness, and social standing of commercial fishers. As a collection of isolated actors not fully utilizing the knowledge and resources of others, these stakeholders struggle to provide expansive and long-lasting change that provides optimal benefits for the fishery.

In this environment, the collection and application of fishery-dependent data collection methods is a difficult task requiring a significant change in attitude and behaviour. For example, fishers need to be convinced that their time and effort participating in such data collection programmes will be well served and not used solely as leverage to impose further restrictions or hardship. Management authorities and other stakeholders need to be convinced that incorporating such data into fishery management systems is time and effort well spent, particularly given that current systems are generally poorly geared towards the inclusion of these data and oft-held concerns over the trustworthiness of data collected by fishers.

Although the fishing industry is often resistant to change, the application of change management concepts and models [for a review, see Cameron and Green (2012)] provides a new opportunity to reduce or eliminate barriers to change and facilitate fishery development. These concepts and models have successfully been applied in the business world, but their formal application to the fishing industry appears scant, piecemeal, and without knowledge of change management theory. Furthermore, with an increased focus on ecosystem-based fishery management (EBFM), there is need for a flexible and adaptive integrated framework that is supported by the participation of multiple stakeholders (O’Boyle et al., 2012), and an understanding of change management has the potential to facilitate greater cross-sectorial collaboration and sustainable utilization of ecosystem resources.

We explore the theory of change management, including why individuals are resistant to change, and describe how one commonly used change management model can be applied to the commercial fishing industry. We also describe how this model can be used *a priori* to prepare for the challenges of working with the fishing industry, and how it can be used *a posteriori* to identify why past change initiatives were successful or otherwise. To support our thesis, we present several recent examples of change initiatives that we were involved in with fishers in the New England groundfish fishery.

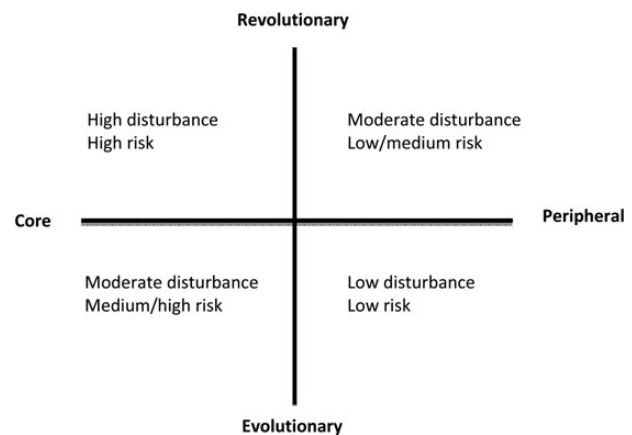
### Change in the fishing industry

With few exceptions, the pace of change in the commercial fishing industry has been too slow to meet demands for sustainable fishery development and global food security. Change in these areas has been erratic and uneven, both between and within developed and developing countries.

Most change that has occurred in the fishing industry can be considered evolutionary. Evolutionary change occurs continuously, in increments, and gradually over a period (Burke, 2002). It is characteristic of most change efforts including those designed to improve performance or efficiency and does not change the culture or basic nature of an organization or business. In the fishing industry, evolutionary change would include the adoption of modified fishing gear to increase catch rates or reduce fuel consumption. This type of change may develop erratically, e.g. as fishers apply modified fishing gear at different times or in different fishing grounds; as a result, the impact of evolutionary change between fishers is inconsistent.

Much less common is revolutionary change. This type of change is planned to revolutionize or transform an entire business or organization to improve performance (Meyerson, 2011). Revolutionary change is episodic in nature, strategically applied, and far less frequent than evolutionary change (Burke, 2002). Most models of change management are designed to introduce this type of change, particularly when replacement of leadership, programme, strategy, structure, system, or culture is required (Jarrett, 2003). In the fishing industry, revolutionary change occurs when fishers are required to alter fishing practice to comply with a significant change in fishery regulations, e.g. the replacement of input controls with output controls. In this instance, the change may require all fishers to replace or significantly modify their fishing gear or behaviour, especially if low-quota species “choke” or limit access to other quota species, and is revolutionary because it is planned to significantly influence most or all participants in the fishery. This change is usually associated with turmoil, and although it can occur quickly (Meyerson, 2011), its effects are long lasting because the goal is irrevocable change.

The success rate of revolutionary change across an entire organization or business is low, with failure rates commonly cited to be around 70% or higher (Beer and Nohria, 2011; Jarrett, 2003; Kotter, 2008). This failure is due in part to the high level of disturbance associated with revolutionary change and an associated level of difficulty in introducing change initiatives, particularly when designed to influence the core business (Figure 1). In the fishing industry, the success of revolutionary change, in the form of radically new fishing regulations, is difficult to quantify. While such change may force the entire fishing fleet to significantly alter fishing practices, the inability of these regulations to fully stem overfishing or



**Figure 1.** Relative levels of disturbance and risk (difficulty) associated with introducing change initiatives to core and peripheral business activities [adapted from Pennington (2003) with permission].

other environmental concern in many of the world’s fisheries would suggest that such initiatives are only partially successful.

**Understanding resistance to change by fishers**

In our experience, reasons for resistance by fishers to revolutionary change are not well understood and at times inexplicable. Furthermore, their inconsistent application or acceptance of seemingly modest evolutionary change is also difficult to understand. Until this behaviour can be understood and confronted, the cost-effectiveness of change initiatives will likely remain suboptimal, be they mandatory directives, a need to protect the very habitat they depend on, or an opportunity to enhance their profitability and viability.

For example, in a recent project known as “A network approach to conservation engineering for New England’s groundfish fishery: collaboration, outreach, and demonstration of alternative fishing gears” (NRCP Reference no. EA133F-10-CN-0322) or GEARNET, efforts were made to fund the most pressing fishing gear needs of fishers in the New England groundfish fishery (see [www.gearnest.org](http://www.gearnest.org) for details). Funded by NOAA’s Northeast Fisheries Science Center, Cooperative Research Program, GEARNET was led by a core group of people working with fishers to test new and innovative fishing gear that they specifically requested. Despite ultimately funding 35 subprojects, some fishers would not participate in GEARNET, although the project provided them an opportunity to test new fishing gear and equipment at little or no cost, including the purchase and installation costs of low-drag netting, new codends, semi-pelagic otter boards, and fuel flowmeters. Other fishers participated in GEARNET initially, but then lost interest and decided not to install the gear or equipment, despite their fuel-saving potential, absence of impact on the catch, or reduction in environmental impact (Eayrs and Suuronen, in press; Glass et al., in press).

In many instances, the change that would result from the long-term use of gear or equipment funded by GEARNET could be categorized as evolutionary core because of its influence on fish landings and profitability. Yet, despite the potential benefits of these efforts to fishers, large numbers of fishers remained unmoved in their interest in GEARNET. Explanations for their behaviour remain unclear, but seem to suggest a desire to maintain the *status quo*. The irony of this

behaviour is that, during the life of GEARNET, the fishery was declared a national disaster, as the full impact of massive cuts in cod (*Gadus morhua*) and yellowtail flounder (*Pleuronectes ferruginea*) quota began to take effect.

**Competing commitments and big assumptions**

The above examples from GEARNET point to fishers making a conscious decision not to change despite knowledge of the benefits of doing so and low risk to their profitability. Something else was impeding change and driving their behaviour, but which requires an understanding to garner their future acquiescence and bring about meaningful and timely change.

According to Garvin and Roberto (2011), most people find it difficult to change their behaviour and habits when ways of doing things in the past were sufficient or satisfying. In this regard, fishers should not be expected to be any different, particularly if evidenced by their readiness to reminisce to past days about bountiful catches and relatively unfettered access to fish stocks. Reminiscing during difficult times can serve to fuel a legacy of disappointment and resistance to change, and calls to do so are often met with distrust, scepticism, and knee-jerk resistance (Garvin and Roberto, 2011).

A possible reason for an individual’s resistance to change could be due to their hidden *competing commitments* (Bowe et al., 2003; Kegan and Lahey, 2011). A competing commitment is a subconsciously hidden goal by an individual that conflicts with their stated commitment, to which they unwittingly take steps to ensure are unsuccessful (Kegan and Lahey, 2011). Competing commitments serve as a type of personal immunity to change, a subconscious effort to protect oneself that undermines the efforts of others despite a publicly stated desire to change. Such behaviour may explain why fishers initially interested in opportunities funded by GEARNET walked away. It may also explain why individuals can expend greater energy rationalizing the *status quo* in difficult times rather than changing it (Bowe et al., 2003).

Once a competing commitment is recognized, the seemingly irrational behaviour appears sensible, smart, and understandable (Kegan and Lahey, 2011). The individual is protecting himself or herself from critically examining or questioning their own core beliefs or *big assumptions*, their surrounding environment, and

**Table 1.** Conceptual phrases in the process of identifying competing commitments and testing the validity of the big assumption.

Starting point	Primary commitments	Contradictory behaviours	Competing commitments	Big assumption	Strategy to test the big assumption
“I need...”	“I am committed to...”	What am I doing or not doing that prevents realization of my commitment?	“I am also committed to...”	“I assume that...”	What strategy can I apply to test the big assumption?
“...my fishery to be exploited sustainably”.	“...applying sustainable fishing practices”.	“I am not being proactive in reducing bycatch”.	“...avoiding being scrutinized by fishery managers and NGOs”.	“...criticism of my fishery will follow by raising awareness of bycatch”.	Work with fishery managers and NGOs to provide clarity and erode misperceptions
“...fishery scientists to do a better job assessing stock health”.	“...a well-managed fishery”.	“I do not take care completing my log book with accurate details”.	“...ensuring my fishing quota is not reduced”.	“...with refined stock assessments my quota will be reduced”.	Evaluate impact of quality logbook data on quota in healthy fisheries
“...assumed discard levels to be reduced”.	“...reducing assumed discard levels”.	“I refuse to allow onboard cameras film my deck”.	“...avoiding my crew being observed discarding fish”.	“...I will be forced to change my fishing practice”.	Understanding a need for cameras and their contribution to assumed discards

their role or status in the environment. Big assumptions are formed from life experiences, over a long period, and they put an order to an individual's world. They are usually deep rooted, not consciously realized, and accepted as reality (Kegan and Lahey, 2011; O'Brien, 2012). Because competing commitments are themselves seldom examined critically and are part of the fabric of an individual's existence, they unknowingly serve to reinforce big assumptions and keep them intact (Kegan and Lahey, 2011).

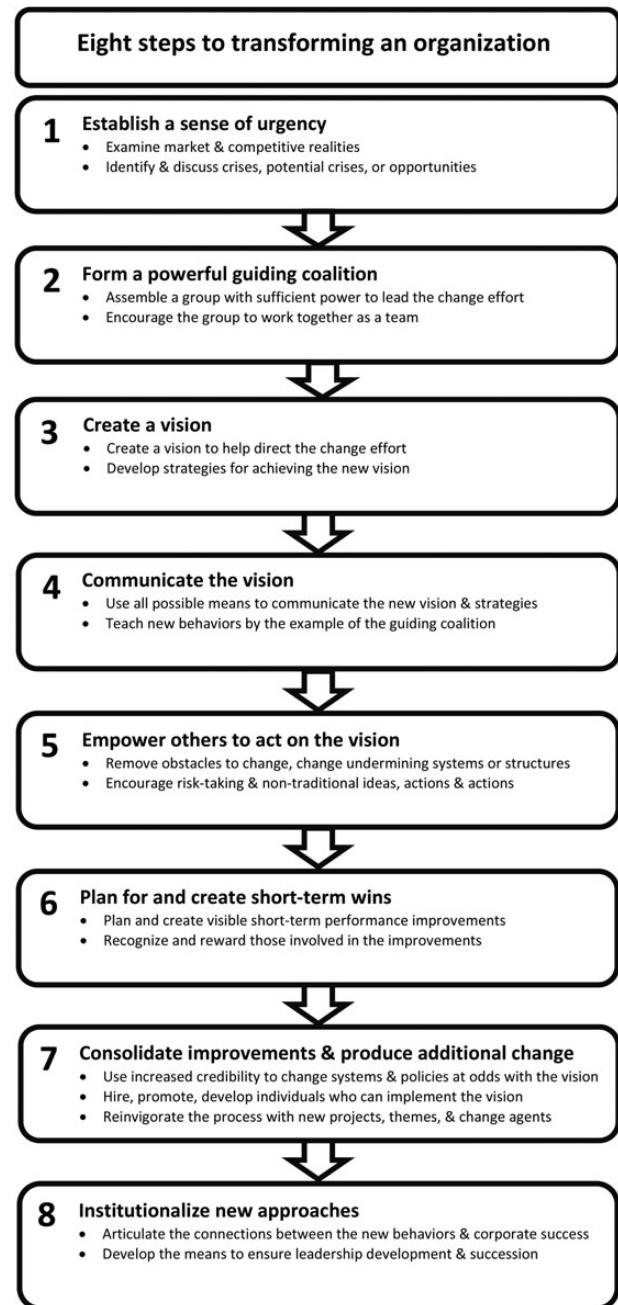
Uncovering an individual's competing commitments and big assumptions is important to help the individual become effective and make significant contributions to change. It also helps individuals recognize that their competing commitments are a hindrance to success and prepares them for cultural changes resulting from revolutionary change (Bowe *et al.*, 2003). A simple, stepwise process for helping an individual identify and question his/her competing commitments and big assumption is provided in Kegan and Lahey (2011) and Bowe *et al.* (2003). This process also involves working with an individual to systematically identify behavioural changes needed for personal or professional growth and ultimate recognition of big assumptions (Table 1). It then challenges the individual to test the validity of his/her competing commitments that are impeding change.

Understanding and applying this process goes a long way to understanding behaviour that resists change and provides a starting point from which to focus future change initiatives with the individual. It can also be used to focus change initiatives of entire organizations, especially where individuals with common backgrounds and experiences have similar competing commitments and big assumptions. For example, fishers often have common assumptions about the need for bycatch reduction or protection of the seabed, and their contradictory behaviour may be very similar. It may also contribute to the behaviour of fishery management authorities and others regarding their perception that data collected by fishers are untrustworthy and unreliable.

### A way forward?

There are currently a number of change management models that can be applied to facilitate organizational and business change; one of the most common is by Kotter (Mento *et al.*, 2002; Cameron and Green, 2012). Kotter's model (Figure 2) is an eight-step process that has been used to guide many corporations both nationally and internationally through the process of introducing and cementing revolutionary change. Importantly, this model can be used *a priori* to identify key stages in the change process and where resources need to be assigned, and it can be applied *a posteriori* to help identify why change initiatives were less successful than anticipated and were not embedded into the culture within a group or organization.

This model is a response to eight commonly observed errors to establish permanent change (Kotter, 2008). The first and biggest error is to attempt change without establishing a sense of urgency. This results in a lack of enthusiasm and complacency, and always leads to failure in bringing about hoped-for change to the fullest extent practicable. For example, a lack of buy-in by fishers for new fishery regulations means that they will reluctantly acquiesce to change and not fully apply themselves. Therefore, the outcome of the new regulation is unlikely to be fully realized, or fishers will actively seek ways to circumvent the impact of the new regulation. The second error is to create an insufficiently powerful guiding team or coalition that lacks credibility, expertise, and leadership to create a climate for change. Individuals alone seldom have the competency



**Figure 2.** Kotter's eight-step change management model. Reprinted with permission from Kotter (1996). Copyright (2012) by Kotter; all rights reserved.

and charisma to sufficiently create long-lasting change, and a powerful coalition is essential. In many fisheries, fishing fleets are poorly organized, and there is little collaboration among fishers to optimize outcomes. The independent nature of fishers is a substantial contributor to poor collaboration. Ideally, the guiding coalition should comprise a diversity of fishers affected by a proposed change, preferably including representatives of all fishing methods, boat sizes and types, and old hands and new. The identification and engagement of early adopters is essential at this point. The third error is underestimating the power of vision to guide and inspire individuals to change. The vision must be clear, concise, and easily articulated.



Failure to overcome any of these three errors almost always leads to failure because the appropriate climate for change has not been established (Kotter, 2008).

The fourth error is undercommunicating the vision. Change will not occur if people do not believe that the benefits of change are attractive, and that revolutionary transformation is possible. Communication, both verbally and through actions, is vital and requires a committed, sustained, and coordinated effort. Fishers are often highly parochial in their communication and beliefs; therefore, gaining their support for change requires a substantial undertaking. Failure to do so risks rumour and innuendo throughout the fleet. Furthermore, if fishers are witnessed ignoring or circumventing the change, the enthusiasm of other fishers will be challenged, and the initiative is likely to fail. The fifth error is permitting obstacles to block the new vision. These obstacles may be based on perception, emotion such as fear or anxiety, parochialism, or due to business structure, practice, or culture. Again, the nature of fishers makes it very difficult to overcome this error (although in many instances, regulatory complexity and rigidity of many fishery management systems is also a major obstacle to change). A key challenge is overcoming how these obstacles influence radio or dock-side conversation among fishers. Therefore, a major role of the guiding coalition is to turn around this negative “chatter” and increase the frequency of positive communication. The sixth error is failing to produce short-term wins early in the change process. These wins may be in the form of increased salary, profit, or reward, and are essential because they serve to encourage individuals to stay the course and maintain momentum. In a fishery, this might be in the form of increased landings or catch value, reduced fuel consumption, or increased access to fishing grounds or fish stocks. Such success is also likely to lead to better buy-in, communication, and participation by fishers. Committing errors four, five, or six risks an inadequately engaged or enabled individual or organization and will compromise potential for change (Kotter, 2008).

Error seven is to declare victory too soon and lose momentum. This occurs when change initiatives are successful and resources are then redirected elsewhere. According to Kotter (1996, 2008), it must be emphasized to focus attention on these initiatives until the desired outcome is deeply embedded in the culture of an individual or organization. The final error is failure to deeply embed changes into the culture of an individual or organization. Only when a new behaviour becomes a norm is it likely to be cemented in place and prevent regression. This can be achieved by two key approaches: (i) that demonstrate repeatedly over long periods how performance has been improved through changes in behaviour and attitude and (ii) allow sufficient time to pass to ensure the next generations of individuals personify the new approach. In a fishery, this may require providing fishers adequate opportunity to learn and become comfortable using new or modified fishing gear over a range of operating conditions, and to pass on their findings to other fishers.

The core challenge in all eight stages of Kotter’s model is changing people’s behaviour. An underlying premise underpinning the model is that people change because they are shown a truth that influences their feelings and less so because they are given analysis that influences their thinking (Kotter, 2002). Strong leadership rather than management is, therefore, key. Kotter argues that the mantra of “See, Feel, and Change” must be applied within each of the steps to bring about effective change, and that this is significantly more powerful than the traditionally applied “Analyse,

Think, and Change” approach. As each step is implemented, the guiding coalition must garner the support of others by making them see the need for change, the solution, and progress towards a successful outcome. Kotter argues that visually compelling evidence or situations to help others visualize that the problem or solution is essential. This is not only about providing reams of supporting data and analysis, but also about providing evidence through other means including live presentations, role play, demonstrations, and video. This visualization then invokes a visceral response that enhances feelings such as urgency or optimism and depresses feelings such as fear, anxiety, or complacency. The result is a change in behaviour that strives towards instituting, reinforcing, and cementing change.

Kotter’s model continues to receive widespread support by businesses and corporations in the United States and internationally (Cameron and Green, 2012), and it appears considered relevant to US fisheries and wildlife conservation change initiatives [for example, see Decker *et al.* (2011) and US Fish and Wildlife (2012)]. However, it does not appear to have been previously considered or applied in a commercial fisheries context. We believe that this model is highly relevant to fisheries. With the benefit of hindsight, we have repeatedly witnessed the making of the eight errors identified by Kotter or their total absence in change initiatives.

### Fishery-dependent data collection

With many New England groundfish fishers seemingly unprepared to embrace revolutionary change, the successful introduction of fishery-dependent data collection programmes could be at risk. For example, ongoing efforts to encourage these fishers to use electronic logbook software have struggled to gain traction in recent years, despite the provision of free laptops, training, software, and ongoing technical support (C. Carlin, pers. comm.). In considering Kotter’s model, the lack of interest by fishers is not surprising. From the perspective of fishers, there is no sense of urgency driving a need to use these logbooks, no vision, and little evidence of direct or immediate benefits to be derived from their use. Furthermore, despite the involvement of a highly competent group of researchers, technicians, and fishery management authorities, the guiding coalition does not include fishers and does strongly encourage fishers that are using the logbooks to champion the cause to others. Despite this initiative being located in the evolutionary peripheral change domain, key components of Kotter’s model are lacking, and the widespread use of electronic logbooks may be a distant outcome unless appropriate steps are taken.

### Discussion

This study has described difficulties in encouraging fishers to change and participate in conservation engineering and fishery-dependent data collection initiatives. The example of GEARNET is just one of many real-life examples whereby fishers have demonstrated resistance to change. We also have significant experience with this issue in other fisheries nationally and internationally, and are aware that many other fishing gear researchers have similar experiences. For example, despite a plethora of conservation engineering research initiatives around the globe in recent decades, in many instances with the involvement of a small number of fishers, the issue of bycatch and discarding still remains a significant global problem (Glass *et al.*, in press). Therefore, we feel that a new approach is timely and required to overcome resistance by fishers to change, and one that provides a guiding framework that is sufficiently flexible to suit almost any fishery or circumstance.

We believe that Kotter's model provides rational and coherent guidance in thinking of change management and its application in a fisheries context. While the model cannot guarantee complete success, it contributes to a greater appreciation of the role of change management in fisheries and, therefore, increases the likelihood of successful outcomes. Establishing a sense of urgency, building a guiding coalition, and establishing a clear vision are vital first steps in any change initiative. This requires an understanding of the competing commitments and big assumptions of fishers, so that appropriate steps can be taken to ensure that they "see and feel" the need to change. In GEARNET, we highlighted to fishers a range of benefits arising from their engagement, we instituted a strong bottom-up approach, and we funded projects that they specifically requested. However, the level of success of some of these projects could have been due to competing commitments and big assumptions of fishers hindering their ability to see and feel a need for their engagement. Perhaps the proposed incentives caused mounting suspicion of our ultimate intent. Perhaps fishers felt restrained in their ability to accept our support or did not want to be viewed by their peers receiving an advantage not available to all others. Perhaps they simply did not want to introduce further change when surrounded by other substantial changes. Whatever the answer, their behaviour goes some way to explaining why economic incentives for fishers to change may at times have only limited success, and without taking steps to develop and present an appropriate change management plan, initiatives for change will continue to provide sub-optimal outcomes.

We were unaware of the Kotter model when GEARNET commenced and, therefore, did not deliberately apply the eight-step process. However, at the time, we believed that the impact of quota adjustments in the fishery, the relevance of projects, our team of respected and experienced project leaders (including fishers and netmakers), and our extensive outreach efforts were sufficient to encourage the involvement of most fishers. Clearly, we were not fully successful in our tries, and in hindsight, the application of Kotter's model could have realized greater success by forcing us to focus deliberately on each of the eight steps.

Our struggle to gain the full support of fishers in gear research projects does not bode well for future fishery-dependent data initiatives in the region where the direct or immediate reward of involvement to fishers is limited or non-existent. Furthermore, unless we learn to understand resistance to change and take appropriate steps, the application of EBFM will remain a significant challenge. According to O'Boyle *et al.* (2012), the application of EBFM is a three-stage process. The first stage is an evolutionary change that gradually builds ecosystem considerations into existing fishery management plans. The second stage is an interim period of incorporating ecosystem considerations into existing management plans, and the third stage is a period of revolutionary change as management plans are consolidated into an EBFM plan. Therefore, based on this process, it appears that change management concepts and models have an important role to play in the cost-effective transition towards EBFM.

We acknowledge that Kotter's model may not ultimately be ideal in a fisheries context, and that other more suitable models may exist. However, we believe that this model, at a minimum, provides an opportunity for fishing gear researchers and others to reconsider their efforts and try new approaches to facilitate change. To test this notion, we plan in the future to apply this model to several case studies where groups of fishers have

collaborated to facilitate change. Our goal is to review the development of each case study and identify how closely they (unknowingly) mirrored the eight steps of the Kotter model. In this way, we will test the efficacy of the model in greater detail, build a greater understanding of change management in a fishery context, and hopefully contribute to the enhanced success rate of future change initiatives.

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