Social and economic drivers of bycatch avoidance behavior

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Summary
Voluntary cooperation is a prevalent condition in fisheries, leading to collective action for addressing problems related to locating target species and avoiding bycatch. Collective action is influenced by trust, reciprocity, communication and group size. We initiated a voluntary bycatch avoidance program in 2010 with the US sea scallop fleet to maximize harvest of scallops within the constraints of bycatch limits. The program continued in 2011, 2012 and 2013 with increased participation. To understand the potential influences on program participation, we analyzed three factors: vessel homeport size, ownership status and existence of a prior relationship with SMAST as indicators of communication, group size and trust. Results indicated that vessels with a relationship with SMAST prior to the implementation of the bycatch avoidance program and vessels from large homeports had significantly greater participation. Additional factors that likely influenced participation included accuracy of information on bycatch location, stability of the scallop fishery, and ability for self-monitoring and enforcement. Changing regulatory requirements for bycatch in the scallop fishery between 2010 and 2012 also provided incentive to explore alternative bycatch solutions. The bycatch avoidance program is an example of collective action that was influenced by trust, reciprocity and communication.

Introduction
Most fishery economic models are based on the assumption of competition driven by a motive for profit that allows only market interactions between fishermen. However, the observed behavior of fishermen, with respect to common pool resource use, suggests voluntary cooperation is a prevalent condition (Ostrom 2000). The term “collective action” refers to a situation where more than one individual bears the cost of actions to solve a problem (Dowding 1996). Ostrom (2000) argues that social norms based on reciprocity, trust, and fairness can influence the outcome of collective action. Fehr and Gächter (2000) suggest that reciprocity provides power to enhance collective actions and to enforce social norms. Yellowtail flounder bycatch in the US sea scallop fishery created a collective action problem for the scallop fleet, resulting in premature closure of lucrative scallop fishing grounds several times between 2000 and 2009 (O’Keefe and DeCelles 2013). In 2010, members of the scallop fishery volunteered to share spatially and temporally specific bycatch information with SMAST and used the information to avoid high levels of yellowtail catch to harvest the full allocation of scallops. Several potential factors led to participation in the collective action solution.

Materials and Methods
The levels and potential reasons for participation in the 2010, 2011 and 2012 SMAST Yellowtail Flounder Bycatch Avoidance Program were analyzed. Participation included two categories: 1) vessels that registered for the program (‘registered-only’); and 2) vessels that registered and reported catch to the program (‘registered-and-reported’). Vessel participation in each category was examined against three criteria to determine drivers for registering and reporting: 1) homeport size; 2) ownership category; and
Results and Discussion

A significantly greater proportion of vessels from large ports than small ports registered for the program in all years. Large ports may facilitate more communication and idea sharing among fishing industry members than small ports. Face-to-face communication in collective action problems is expected to increase cooperation (Ostrom 2000). Additionally, large ports may foster relations of trust, allowing industry members to set expectations on the behavior of others. Large ports provide opportunities for small groups and cliques to form, which encourages information sharing (Wilson 1990).

The proportion of vessels participating in the program that had a relationship with SMAST was significantly greater than vessels without a relationship in all years. Through a decade of collaborative research, members of the scallop fleet developed a relationship of trust with SMAST researchers. There was a reciprocal relationship that had established exchanges of information. Relations of trust and reciprocity contribute to the long-term obligations between people and allow common rules to be set in order to manage expectations (Ostrom 2000).

There were no differences in the proportion of vessels that reported catch within all of the criteria. Communication, trust and reciprocity may have been absent from individual vessels while fishing. The uncertainty of who shared information during fishing activities and how individual bycatch rates would be interpreted may have dissuaded some vessels from reporting.

The SMAST Yellowtail Bycatch Avoidance Program is representative of the voluntary cooperation that is often observed in fishing behavior, but more often overlooked in ecosystem and fishery economics models. Identifying potential drivers for human behavior, such as homeport size, vessel ownership status and existence of relationships among stakeholders, allows managers to include quantitative information for decision making.

References