# Engineering Bycatch Reduction in St. Thomas Fisheries: Behavioral Observations

# Ingeniería Utilizada en la Reducción de Pesca Incidental en las Pesquerías de St. Thomas: Observaciones sobre las Conductas de los Peces

# Recherches sur la Réduction des Captures Accessoires par les Pêcheries de St Thomas: Observations Comportementales

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## EXTENDED ABSTRACT

National Standard 9 of the Magnuson-Stevens Fishery Conservation and Management Act [As Amended Through January 12, 2007 (Section 104-297)] states that: *Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch*. The St. Thomas Fishermen's Association (STFA) undertook projects with partners such as MRAG Americas and NMFS to characterize fisheries and bycatch (Olsen et al., In preparation) for the dominant fisheries in the northern US Virgin Islands (USVI). Following those studies, collaborative research was undertaken to reduce bycatch and bycatch mortality in the fish trap fishery of St. Thomas. This paper summarizes efforts to relate fish behavior to escape vent efficiency in releasing thin-bodied bycatch species from traps. Highlights of fishermen's participation in the research and evaluation of vent effectiveness are also being presented (Olsen et al., This volume).

Recent studies of bycatch in the St. Thomas fish trap fishery demonstrated that small surgeonfishes made up 23% of the total numbers and that the highest bycatch mortality affected the surgeonfish species (*A. coerulus* and *A. chirurgus*). Since surgeonfish species have laterally compressed body shapes, these key reef herbivores differ from many of the main target species in the fishery. This offers some hope for bycatch reduction if escape panels can be introduced to let individuals of these species escape without reducing landings of desirable species (Olsen and Hill, This volume).

Study elements included:

i) Measurements of fish lengths, widths and heights were taken to inform sizes of vents to test. Measurements were conducted at fish marketing sites around St. Thomas and aboard participating fishing vessels. Through the size range sampled, relationships among measurements were generated by regression analysis. Size-at-first-maturity for catch and bycatch species were compiled to test concerns over reproductive effects of fishing and desired release sizes.

ii) Diver observations and video analysis of fish behavior in traps to test whether species-specific differences could be discerned in in-trap positioning. If preferred locations could be identified, we might be able to maximize encounters of bycatch species with escape vents. Many species demonstrated consistent patterns.

iii) Combined diver/fishermen studies to test the hypothesis that most fish escape from traps while traps are being hauled. Divers surveyed traps and documented abundances of captured species. After traps were hauled, fish were identified, counted, and measured. Traps were restocked with fin-clipped fish, generally 2 target species and 3 bycatch species. Then traps were reset and fished for 24 hours and resurveyed. Comparative abundances demonstrated that few fish escaped during hauling. This study was extended to look at retention of marked fish over periods of 1, 3, 5, and 7 days. Data collected showed that egress and ingress are constant processes in fish traps.

iv) Vent position choice experiments, with divers and underwater video were used to test how quickly fish can find an open escape vent and whether fish would demonstrate any preferences for vents placed in the upper or lower quadrants of the traps and for vents placed in the sides or ends of the traps. Definite species-specific preferences were identified and these data were used to guide long-term testing in the fishery.

In each instance, the data from this suite of studies, meshed with the capabilities of the fishing participants in field-testing various escape vents. Different sizes and vent locations were tested and the samples sizes obtained added greatly to the confidence in the outcomes of the study. The interactions of researchers and fishermen greatly improved the overall study and made possible sampling regimes that otherwise would be unaffordable to a research budget.

KEY WORDS: Fish traps, bycatch, U.S. Virgin Islands

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