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Catch Per Unit Effort Spatial Metric for Pelagic Longline Catch and Effort Data from the Western North Atlantic Tuna Fishery

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Catch per unit effort (CPUE) is a quantitative method used to describe fisheries worldwide. CPUE can be presented as number of fish per 1000 hooks, number of fish per amount of fishing time, or with any unit of effort that best describes the fishery (i.e., search time, hooks per hour, number of trawls, etc.). CPUE is commonly used as an index to estimate relative abundance and is then applied within stock assessments so that fisheries managers can make justified decisions for how to manage a particular stock or fishery using measures such as catch quotas, catch limits, and gear or license restrictions. For commercial pelagic longline fisheries, onboard observer data are considered the only reliable data available due to the large-scale migratory behavior of highly migratory species and because of the high costs associated with fisheries-independent surveys. Unfortunately, fishery-dependent data can be biased in favor of the target species and the subsequent CPUE frequently overestimates relative abundance. The spatial distribution of fish and fishing effort is essential for understanding the proportionality between CPUE and stock abundance. A spatial metric for PLL CPUE can increase the accuracy of relative abundance estimates by utilizing small-scale area specific CPUE rather than a CPUE that does not incorporate geographic data, which will in turn increase the accuracy of stock assessments and provide fisheries managers with the best information possible. This research utilizes a comprehensive eight-year (2003-2010) observer catch and effort dataset from the western North Atlantic U.S. PLL fleet targeting yellowfin tuna, swordfish, and bigeye tuna. Utilizing latitude and longitude coordinates recorded at the set and haul of each deployed section buoy, a spatial metric was created specific to the distribution of fishing effort from the longline fleet. Areas with increased habitat utilization of target and bycatch species such as bluefin tuna, marine mammals, sharks, and sea turtles, are highlighted using ArcGIS and R programming.