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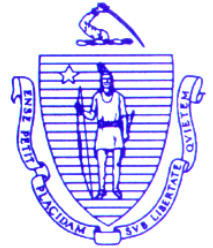
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Marine Fisheries' Gulf of Maine Cod Industry-Based Survey (IBS): Spring/Summer 2017 to Begin and 2016/2017 Preliminary Results

Marine Fisheries will continue our Gulf of Maine (GOM) Cod Industry-Based Survey (IBS) next month. What follows is an explanation as to why we have begun and now continue this valuable survey of cod and other groundfish in the southwest portion of the Gulf of Maine. We also provide some preliminary conclusions from the spring/summer 2016 and fall 2016/winter 2017 surveys. Of note, the UMass Dartmouth SMAST Video Trawl Survey of areas in and near Stellwagen Bank also will begin again in April. DMF and SMAST are working together to evaluate GOM cod abundance and distribution by dovetailing the two surveys to increase our understanding of the size and distribution of cod aggregations.

Stock assessments of Gulf of Maine cod have shown a steep decline in biomass in recent years. This pessimistic view of the stock has resulted in severe reductions in annual catch limits for the commercial fishery.

Because of the multispecies nature of this fishery, a low cod quota acts as a “choke stock” for most fishermen effectively preventing them from accessing their available catch allocations of more abundant stocks. In other words, when fishermen use up their cod allocations, they are faced with an unfortunate choice: either cease fishing for the year or lease quota from others often at exorbitant rates and exceeding the market price of the fish.

For this reason, much attention has been focused on the quality of the data and credibility of the analyses behind the stock assessment. Many fishermen find it hard to believe that such extreme conservation measures are necessary, particularly given their continued high catch rates of cod.

In an effort to help reconcile these different perspectives on the status of GOM cod, *Marine Fisheries* last year initiated a new bottom trawl survey to provide answers to many of the questions underlying the fishing industry’s disbelief in the stock assessment. Through several meetings with fishermen and scientists, we developed a survey approach to intensively sample the core area of GOM cod using a commercial fishing vessel, but according to a randomized survey design providing scientific credibility.

Based on all existing datasets, the portion of the GOM west of 69.5 degrees longitude contains greater than 95% of the GOM cod biomass, and it serves as the study area for our Industry-Based Survey (IBS). To better align the survey with cod spawning seasons as well as the management system, the entire IBS study area is sampled eight (8) times each year, once each month from April-July and October-January. We recently completed the first full year making a total of 325 successful tows.

A decade ago, DMF conducted a similar industry-based survey with a focus on GOM cod. This earlier effort (“IBS1”) surveyed the entire US portion of the Gulf of Maine out to 140 meters in depth. This broad study area was sampled five times each year, working continuously from November through May. Between 2003 and 2007 we made a total of 2,504 successful tows.

Despite the modified survey area, the current IBS work (“IBS2”) uses identical survey equipment and towing protocols. This consistent methodology gives us the opportunity to measure the relative change in the population over the past decade.

To account for seasonal differences in cod distribution, we compared the Spring/Summer months of both surveys separately from the Fall/Winter months, yielding two indices of relative abundance. The information collected to date suggests there has been a significant decrease in cod biomass over the past decade (see figure: spring index -82%; winter index -77%). *However, given the inter-annual variability seen in the IBS1 years, additional survey work will be necessary to provide a clearer picture of the magnitude of this change. Furthermore, swept-area estimates of biomass have yet to be calculated for comparison with video trawl survey results, and that should be revealing.*

Another notable change between IBS1 and IBS2 is with the size distribution of cod. Under the IBS1 years, the most abundant size classes were juveniles below the legal minimum size. Furthermore, the distribution in those years extended out to large “whale” cod in excess of 40 inches (~100 cm). In contrast, the first year of IBS2 caught very few juvenile cod, as well as far fewer large cod (see figure). Currently, the most abundant size class is between 20 and 30 inches, known as “markets” by fishermen and seafood dealers.

This change in size distribution has the potential to explain a large part of the disagreement between fishermen and stock assessments. The commercial fishing industry is restricted to a minimum mesh size of 6.5”, far larger than the 2” mesh of our survey net which allows us to see a much broader portion of the size distribution. Because of this key difference, a drop in the biomass of juvenile cod is largely undetectable to the fishing industry.

A related issue confounds fishermen’s ability to witness the full extent of a drop in the large size classes as well. A major part of the management system of the GOM groundfishery relies on closed areas that prohibit access to certain areas either seasonally or year-round. Many closed areas protect aggregations of large cod, particularly during spawning seasons. As a consequence, most large cod in the population are unavailable to the commercial fishery. By conducting IBS tows both inside and outside of closed areas, we can describe this difference in size distribution for the whole population and the portion available to the fishery.

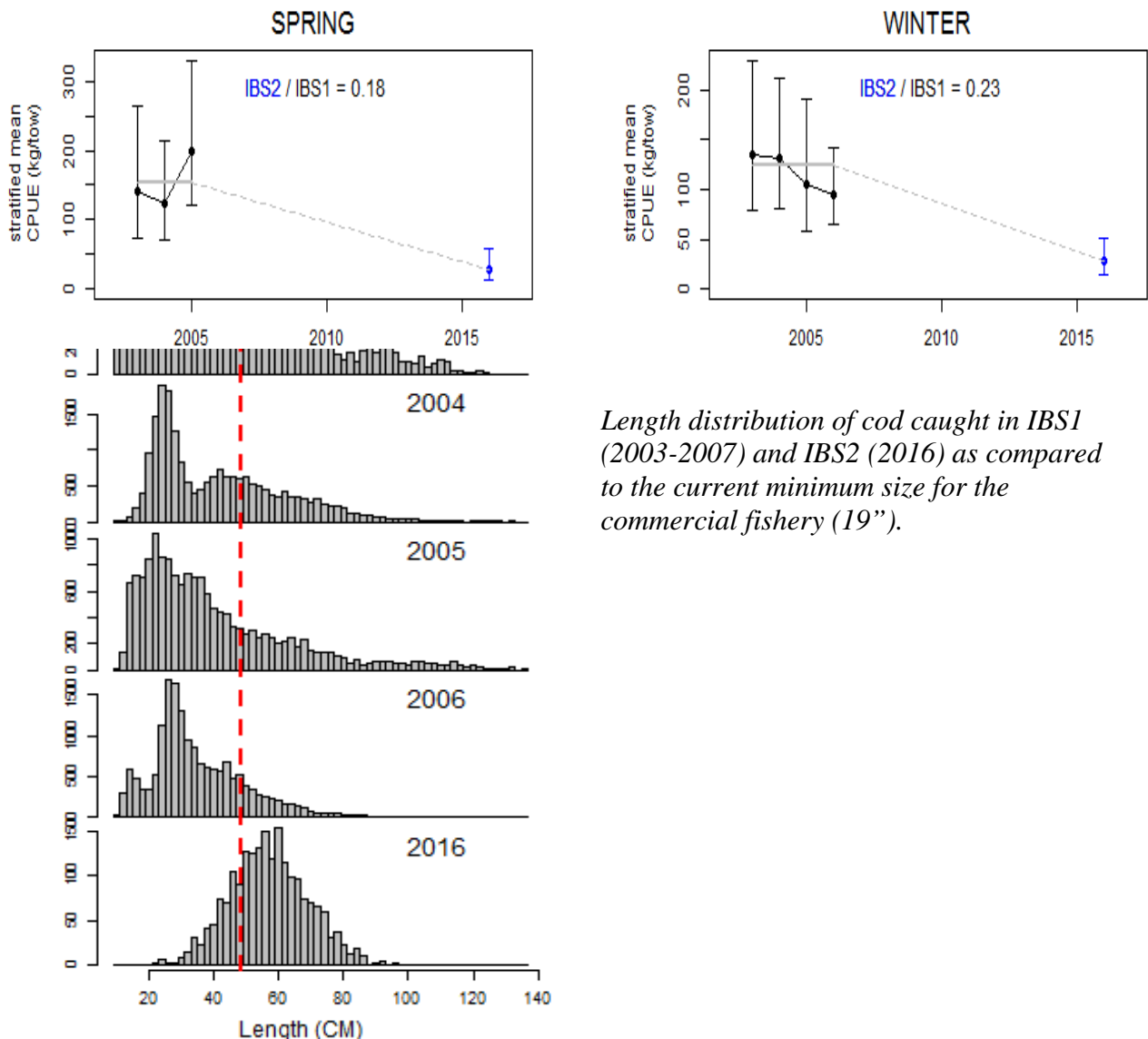
It is important to point out that while our preliminary results indicate a significant decrease in cod biomass our survey data also corroborate the perspective of many members of the fishing industry. If we account for the difference in mesh size and focus just on “market” size cod to minimize the effect of closed areas, we see little change in the abundance between the IBS1 and

IBS2 years. In other words, we wouldn't expect the fishery to notice a change in catch rates over the past 10 years, given the restrictions in place on when, where and how they fish.

Another key by-product of our IBS work is the ability to construct monthly maps of the spatial distribution of each groundfish species. We are making these data available to the public as a tool for fishermen in their efforts to identify times and areas where high-quota stocks can be caught without catching "choke" stocks like cod. These data can be accessed at: <https://madmf.shinyapps.io/ibs2>. We welcome any comments about the usefulness of these maps by fishermen trying to manage their own catch-share portfolios.

The Industry-Based Survey provides a unique perspective on the status of GOM cod, and several important signals are evident from the dataset generated thus far. However, additional years of survey work are necessary to confirm these trends and provide precision and clarity on our estimates. The survey starts up again next week, and we look forward to another successful year of providing critical information to improve the assessment, management and sustainable harvest of this important resource.

Indices of relative abundance from the DMF Industry Based Surveys. Only tows from the area common to both IBS1 and IBS2 surveys were used. CPUE = catch per unit effort in kilograms per tow (100 kg = 220.5 pounds). Bars around the means are 90% confidence intervals (90% confident the mean lies within that range).



Length distribution of cod caught in IBS1 (2003-2007) and IBS2 (2016) as compared to the current minimum size for the commercial fishery (19").