STATUS REVIEW REPORT OF ATLANTIC BLUEFIN TUNA (*Thunnus thynnus*)

Prepared by the

Atlantic Bluefin Tuna Status Review Team

for the

National Marine Fisheries Service
National Oceanic and Atmospheric Administration

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greater (400 m). Additionally, 94 exploratory wells and 48 development wells were drilled in 2007. Of the 48 development wells drilled, 60 percent were in water depths greater than 5,000 ft. Eight new deepwater discoveries were announced by oil and gas operators in 2007 with the deepest in 7,400 ft of water (MMS, 2008). Many of the shallower sites and most of the deepwater sites fall within habitats used by HMS, particularly by bluefin tuna. Many of the deeper sites are also located within the proposed HAPC for bluefin tuna. The continued expansion of deep water oil exploration is detailed in the MMS report, "Deepwater Gulf of Mexico 2008: America's Offshore Energy Frontier," which chronicles the activities of the oil and gas industry in the deepwater (1,000 ft of water or more) areas of the Gulf of Mexico over the past sixteen years (MMS, 2008(b)).

In the Atlantic, ten oil and gas lease sales were held between 1976 and 1983. Fifty-one wells were drilled in the Atlantic OCS; five Continental Offshore Stratigraphic Test (COST) wells between 1975 and 1979, and 46 industry wells between 1977 and 1984. Five wells off New Jersey had successful drillstem tests of natural gas and/or condensate. These five wells were abandoned as non-commercial. Reports on each of the eight exploratory and two COST wells drilled in the North Atlantic Planning Area are available and reports on 10 of the 34 wells drilled in the Mid-Atlantic Planning Area are available on the MMS webpage at http://www.gomr.mms.gov/homepg/atlantic/georges_bank.html.

For oil platforms, there are direct and indirect impacts to the environment such as disturbance created by the activity of drilling, associated pollution from drilling activities, discharge of wastes associated with offshore exploration and development, operational wastes from drilling muds and cuttings, potential for oil spills, and potential for catastrophic spills caused by accidents, such as the Deepwater Horizon (DWH) oil spill in 2010 (described in detail below), or hurricanes and alteration of food webs created by the submerged portions of the oil platform, which attract various invertebrate and fish communities. Anecdotal information suggests that some recreational fishermen may target various fish species, including HMS, in the vicinity of oil platforms due to increased abundance and availability near platforms. The apparent increase in abundance of several species may be due to increased prey availability resulting from various fish and invertebrate communities that are attracted to or attach directly to the structures and submerged pilings. While the apparent increase in abundance of fish near oil platforms may appear to be beneficial, little is known about the long term environmental impacts of changes caused by these structures to fish communities, including potential changes to migratory patterns, spawning behavior, and development of early life stages. Currently, there is debate about whether the positive effects of the structures in attracting fish communities would be reduced by removal of the platforms when they are decommissioned.

Deepwater Horizon Oil Spill

The potential effect of the DWH spill on the future abundance of western Atlantic bluefin tuna was evaluated by comparing the projections made by the ICCAT Standing Committee on Research and Statistics (SCRS, 2010) with similar projections that assume the number of yearlings (one-year-old-fish) in 2011 will be reduced by 20 percent. The value of 20 percent was based on the recent report by the European Space Agency that suggested that about 20 percent of the spawning habitat was oiled. The SRT noted that another study (SEFSC, 2011, pers. comm.) suggested that considerably less than 20 percent of the spawning habitat for the western DPS was

affected by the spill. Moreover, if some larvae survive their encounter with oil and associated toxicants, or if density dependent processes are involved in the mortality of bluefin tuna after the larval phase, then a 20 percent loss of spawning habitat might result in something less than a 20 percent reduction in the expected number of yearlings. On the other hand, factors such as the distribution of oil below the surface and the advection of larvae into the spill area after spawning are not well known. Accordingly, the SRT regarded 20 percent as a reasonable upper bound for the mortality rate of bluefin tuna larvae owing to the spill event.

The results of the projections for the two alternative models used by the SCRS to represent the future recruitment of young fish to the western DPS (i.e., the high and low recruitment potential hypotheses) are presented in Figure 6.1. The 20 percent reduction in the 2010 year-class (2011 yearlings) results in less than a 4 percent reduction in spawning biomass when future catches are within the range historically allowed under ICCAT management (i.e., 2,500 mt or less). This result is not surprising because bluefin tuna are a relatively long-lived species and the 2010 year class is only one of multiple year classes that will contribute to the spawning biomass in any given year. If the TAC remains less than 2,500 mt, as is expected, then the western DPS is expected to continue to increase despite the DWH event. If, on the other hand, catches are allowed to exceed 2,500 mt, then the western DPS is expected to decline and any reduction in the 2010 year class will hasten that decline.

Additional runs were made with the 'MAST' model (Taylor, McAllister and Block, pers. comm.), which uses electronic tagging data in an effort to account for intermixing between the eastern and western DPSs. These runs assumed future catches in the west would be 1,800 mt and future catches in the east would be 13,500 mt (slightly greater than allowed by the current management plans). The results were very similar to those above. In this case, a 20 percent reduction in the 2010 year-class causes only a 3 percent reduction in spawning biomass.

In summary, independent projections with two different types of models show that a 20 percent reduction in the 2010 year-class will likely result in less than a 4 percent reduction in future spawning biomass. However, if a significant fraction of adult bluefin tuna were killed or rendered impotent by the spill, then subsequent year-classes might also be reduced, leading to greater reductions in spawning biomass than estimated above. For example, if 20 percent of the adults were also killed in 2010, then the spawning biomass would be immediately reduced by 20 percent, which might lead to additional reductions in the 2011 and subsequent year-classes (relative to what they would have been in the absence of the spill). The reduction in the 2010, 2011, and subsequent year classes would, in turn, lead to reductions in future spawning biomass levels (9 years later as they begin to mature). To date, however, the SRT has been unable to identify any evidence that any portion of adults were deleteriously affected. The results from several electronic tagging studies confirm that some bluefin tuna have historically spent at least a portion of their time in the waters in the vicinity of the spill area, but the exact fraction is difficult to quantify owing to the uncertainties associated with inferring tracks and the rather low number of samples. All of the electronically-tagged bluefin tuna that were known to have spent time in the Gulf of Mexico during the actual spill event (8 fish) survived long after leaving the Gulf of Mexico.

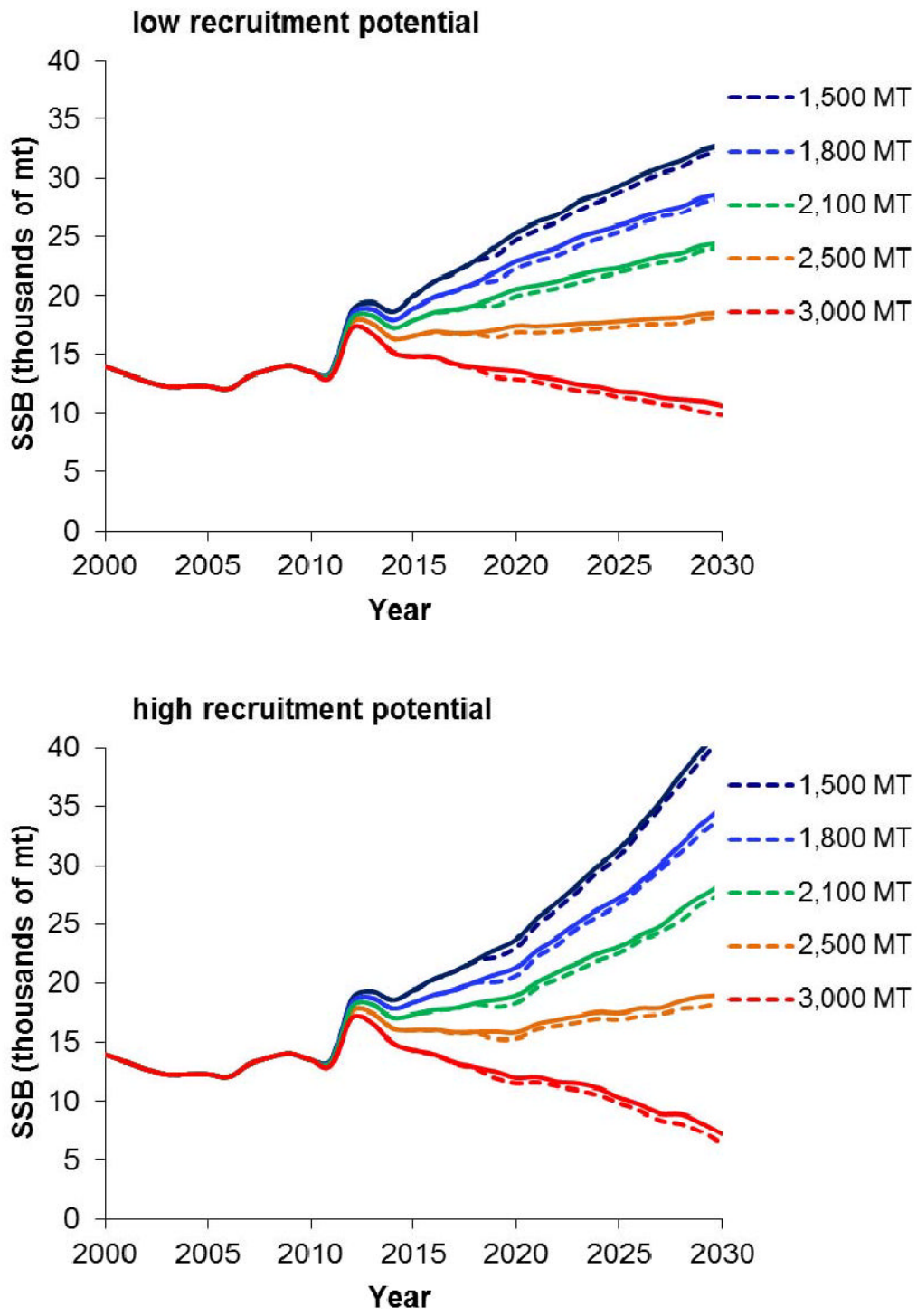

Figure 6.1. Projections of spawning biomass (age 9 and older) relative to the target level (MSY) assuming the 'low' and 'high' recruitment potential models postulated by the ICCAT SCRS. The solid lines represent the trends of the projections under various quotas without regard to the Deepwater Horizon event (as conducted by the SCRS 2010 assessment). The adjacent dashed lines show the corresponding projections when it is assumed that the number of age 1 recruits in 2011 will be reduced by 20 percent (relative to what they would have been had the spill not occurred). The diverging trends in spawning biomass are not marked until 2019 because the age at first maturity is assumed to be nine years old.

Liquefied Natural Gas

Several liquefied natural gas (LNG) facilities have been proposed in the Gulf of Mexico. For LNG facilities, a major environmental concern is the saltwater intake system used to heat LNG and regasify it before piping it to shore. LNG facilities sometimes have open loop, once through heating systems known as open rack vaporizers, which require large amounts of sea water to heat LNG. One such project, Main Pass LNG, which was proposed to be located in the Gulf of