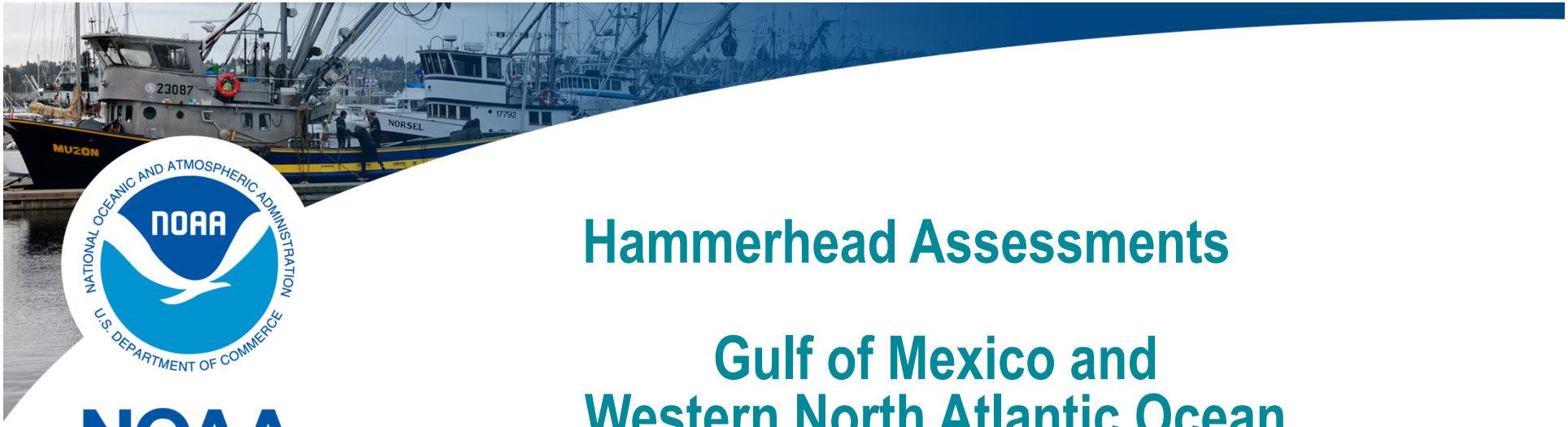


NOAA FISHERIES

SEFSC

Hammerhead Assessments

Gulf of Mexico and Western North Atlantic Ocean

Assessment History & Review

SEDAR 77 (Review Workshop)

August 28 – September 1, 2023

Outline

Hammerhead Shark Stock Assessment History and Review

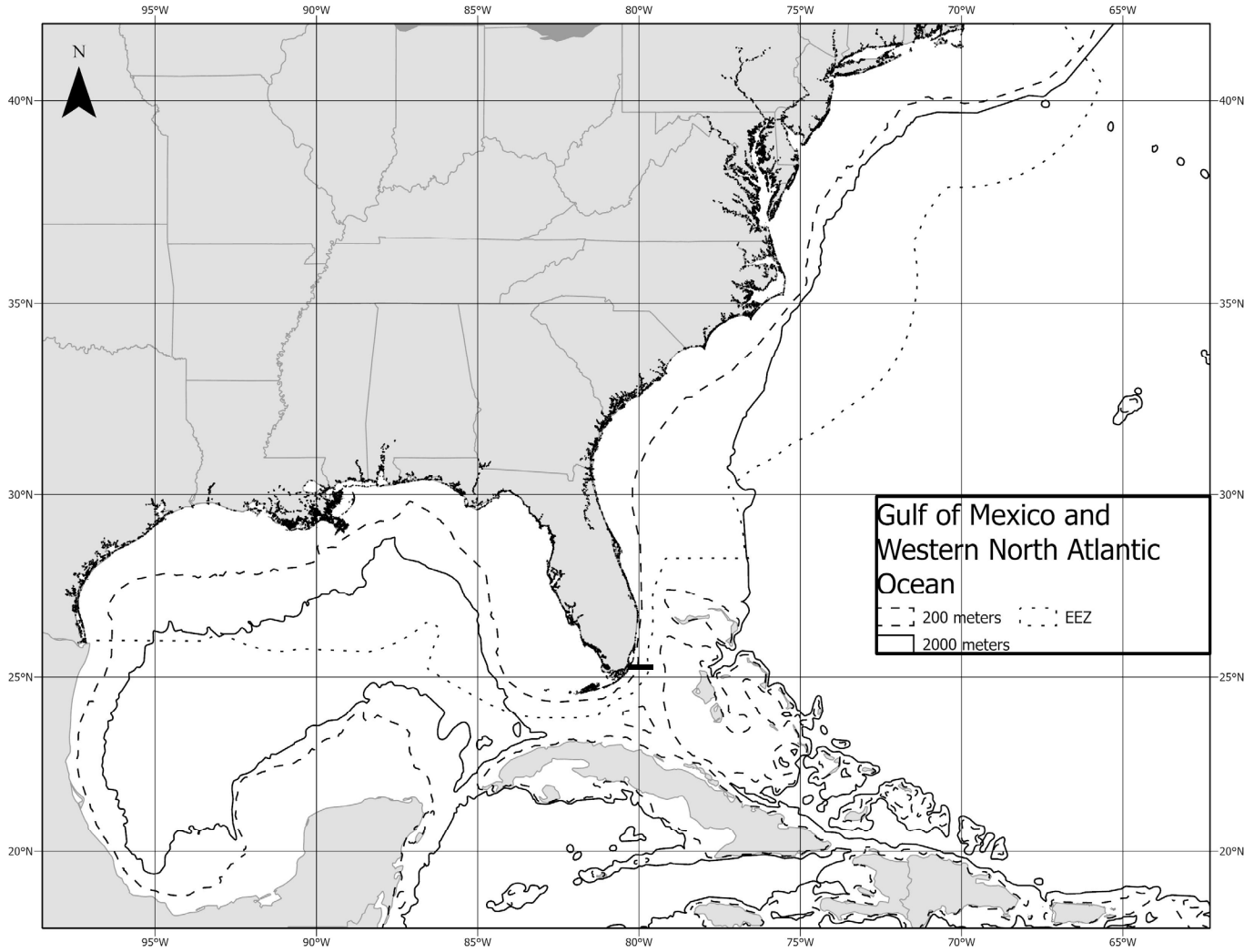
Gulf of Mexico and Western North Atlantic Ocean

SEFSC Assessments External to SEDAR

SEFSC Assessments Within SEDAR

Assessments External to SEFSC & SEDAR

Gulf of Mexico and Western North Atlantic Ocean



SEFSC Assessments External to SEDAR

SEFSC assessed hammerhead sharks together within the Large Coastal Shark species complex, which consisted of multiple shark stocks with the number of stocks in the complex changing over time

- 1990 (Parrack 1990) [SEDAR 77 Ref Doc 59]
- 1994 (NMFS 1994) [SEDAR 77 Ref Doc 60]
- 1996 (NMFS 1996) [SEDAR 77 Ref Doc 57]
- 1998 (NMFS 1998) [SEDAR 77 Ref Doc 58]
- 2002 (Cortés et al. 2002) [SEDAR 77 Ref Doc 61]

SEFSC Assessments Within SEDAR

SEFSC assessed hammerhead sharks together within the Large Coastal Shark species complex within the SEDAR process in 2006 (NMFS 2006; SEDAR 11).

- SEDAR 11 CIE Review
- Mismatching information from various species components within the catch and abundance index data
- Did not support assessment results for use in management
- Recommended prioritizing research, data analysis, and model development to permit species-specific assessments for the main components of the complex

Assessments External to SEFSC & SEDAR

Hayes, C. G., Jiao Y., and E. Cortés. 2009. Stock assessment of scalloped hammerheads in the Western North Atlantic Ocean and Gulf of Mexico. North American Journal of Fisheries Management 29:1406-1417. [SEDAR 77 Ref Doc 49]

NOAA, NMFS, Office of Sustainable Fisheries (OSF), requested that the SEFSC review the Hayes et al (2009) publication for its potential use as the basis of U.S. Management Decisions.

- A SEFSC review determined that it can serve as the basis for U.S. Management [Ref Doc pdf available 8/23/2023]
- Several recommendations from NMFS (2006; SEDAR 11) were addressed, including the use of observer data rather than logbook data
- Removal of the fishery-dependent CPUE time series made for a more optimistic assessment

Assessments External to SEFSC & SEDAR

Hayes, C. G., Jiao Y., and E. Cortés. 2009. Stock assessment of scalloped hammerheads in the Western North Atlantic Ocean and Gulf of Mexico. North American Journal of Fisheries Management 29:1406-1417. [SEDAR 77 Ref Doc 49]

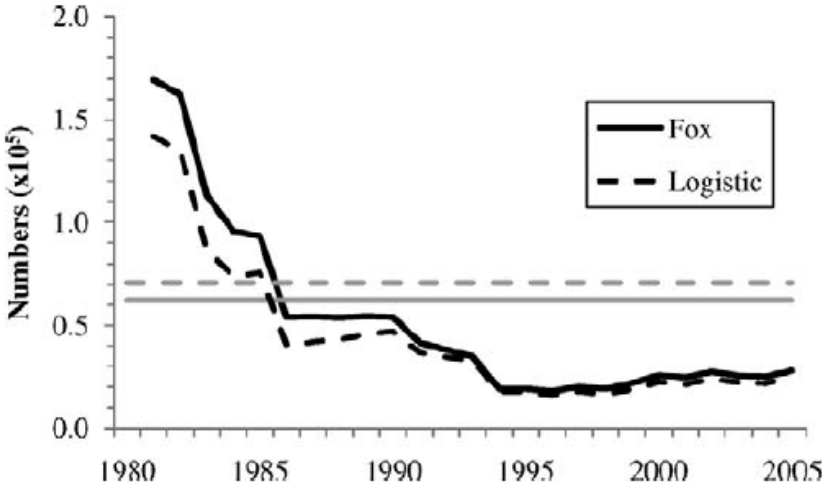


FIGURE 5.—BASE scenario abundance estimates derived from the logistic and Fox models for the period 1981–2005. The gray horizontal lines represent the populations associated with the maximum sustainable yields from the two models.

TABLE 5.—Biological reference points derived from the logistic and Fox models with the BASE scenario. See Table 4 for additional details.

Variable	Logistic	Fox
r	0.29 (0.05–0.45)	0.11 (0.06–0.23)
K	142 (116–260)	169 (126–218)
MSY	10.4 (4–13)	7.1 (5–10)
F_{MSY}	0.15 (0.03–0.23)	0.11 (0.06–0.23)
N_{MSY}	71 (58–130)	62 (47–80)
Depletion (%)	83 (53–90)	83 (67–93)
F_{2005}/F_{MSY} (%)	114 (43–397)	129 (54–341)
N_{2005}/N_{MSY} (%)	35 (19–87)	45 (18–89)

TABLE 6.—Probability (%) that the stock of scalloped hammerheads will rebuild (i.e., attain a final population size greater than N_{MSY}) in 10, 20, and 30 years under several constant-catch scenarios (relative to the catch in 2005) using the BASE scenario with the Fox surplus-production model.

		Percent of 2005 catch (number)			
Time frame	No catch	50 (2,068)	69 (2,853)	100 (4,135)	150 (6,203)
10 years	95	85	70	58	20
20 years	99	96	92	86	50
30 years	99	98	96	91	63

Assessments External to SEFSC & SEDAR

Jiao, Y., Hayes, C., and E. Cortés. 2009. Hierarchical Bayesian approach for population dynamics modeling of fish complexes without species-specific data. ICES Journal of Marine Science 66: 367-377[SEDAR 77 Ref Doc 51]

Jiao Y., Cortés, E., Andrews, K., and F. Guo. 2011. Poor-data and data-poor species stock assessment using a Bayesian hierarchical approach. Ecological Applications 21:2691-2708. [SEDAR 77 Ref Doc 50]

The assessments by Jiao et al. (2009, 2011) were not reviewed by SEFSC for potential use in U.S. Management Decisions

Results relative to SEDAR 77 discussed during presentations and review