

Assessment Model, Terminal Year	Description of Assessment Model	Overfishing?/ Overfished?	In Rebuilding Program?	OFL	ABC/ABC CR	ACL	ACT
ASAP Model, 2019	Statistical Age-Structured Model	No/Yes	No, likely soon	Fmax x B_{CURRENT} (F _{MAX} = F _{FMSY} or FMSY proxy or F _{REB} , depending on stock status) 23,423 mt in 2021 26,292 mt in 2022 44,600 mt in 2023	When biomass is >0.5 for the ratio of SSB/SSBMSY, Fmax is 80% of FMSY. As B declines, F declines linearly, and if B falls below 0.1, then ABC is set to zero. 9,483 mt in 2021 8,767 mt in 2022 11,025 mt in 2023	ABC - Management Uncertainty, as determined by Council; Stockwide ACL = U.S. OY TBD in Framework 8	N/A; In-season AMs close directed fishery at 92% of sub-ACLs and 95% of stockwide ACL
*Fishery prosecuted primarily with midwater trawls (single/paired), purse seines, and small mesh bottom trawls; there is also a small fixed gear fishery in state waters. Most significant management challenges include minimizing interactions with non-target species like river herring, shad (RH/S) and some groundfish (haddock). The role of herring as a forage species and importance of herring to the ecosystem are also important management considerations.				MSY/OY	AMs	Discards	State Waters
				MSY defined by assessment (99,400 mt in 2020 assessment); OY = Stockwide ACL	Closure of management areas at 92% sub-ACL; closure of directed fishery at 95% total ACL; overage deductions and carryover provisions; AM to close large areas when haddock sub-ACL or RH/S catch caps are reached	Less than 1% of total catch; added to landings for assessment; counted against management area sub-ACLs	Deducted from ABC as part of management uncertainty, if necessary (currently no deduction)
Availability of Biological and Assessment Data	Used in Assessment: spring/summer/fall NEFSC trawl surveys (highly variable for herring); catch data from VTRs; observer data; age data for catches (port samples) and trawl surveys (not summer); diet/consumption data (imprecise); catch-at-age data from port samples and survey - ageing fish is an ongoing source of uncertainty; Other Data: Hydroacoustic surveys recently added into assessment; larval surveys, state surveys, other sources of data are identified in assessment literature but not used in assessment model						
Recent Performance Against Harvest Control Rule	ABC Control rule relatively new, catch has remained under quotas since ACLs implemented, overfishing not occurring. Catch has declined dramatically in recent years (2018 and 2019) as a result of lower biomass. Catch about 85% of ACL for 2018 and 2019.						
Current Management Program	Limited access fishery (4 limited access categories, 2 open access categories); Catch quotas (TACs/ACLs), divided by management area since 2000; 3-year specifications; AMs to prevent ACLs/sub-ACLs from being exceeded and to address overages; carryovers (up to 10%) for sub-ACL underage; catch caps to manage interactions haddock and river herring/shad; seasonal gear restrictions (mwt) in the inshore GOM; seasonal availability of management area sub-ACLs (1A and 1B); observer coverage and other monitoring/reporting requirements; measures to address net slippage, relatively large inshore gear restricted area for MWT vessels (approved in Amendment 8 - not effective yet).						
Catch, Revenues, and Variability	Total catch averaged 69,000 mt from 2010-2019, with a high of 95,700 mt in 2013 and low of 13,000 mt in 2019. From 2007 to 2018, the annual average price of Atlantic herring has ranged from \$226 - \$550 per metric ton, generally increasing through time.						
Data - Vessels, Permits, Dealers, Processors, Employment	~20 Cat. A/B (LA directed fishery) vessels were active in recent years - these vessels landed >98% of the total catch; ~10 Cat. C vessels (LA incidental catch) are active; over 1,700 open access (Cat. D) permits that land <1% of total ~100 active dealers, mostly bait;						
% Food, % Recreational	100% commercial fishery, no recreational fishery 70% commercial fishery utilized for lobster bait (and recreational fishery bait); 30% for food and other uses including aquaculture feed, canned pet food, livestock food, and industrial and biomedical purposes. Primary market is for lobster bait (June - November), food export is primarily for overseas markets.						
Fishing Communities	The top five primary ports based on several criteria are: Gloucester, MA, Portland, ME, New Bedford, MA, Rockland, ME and Point Judith, RI.						
Other Economic/Social Factors	Direct linkage between lobster fishery and herring (utilization of herring for bait); linkage between herring and recreational fishing industry; linkage between herring and eco-tourism industry						
Major Sources of Scientific Uncertainty	From the 2020 Assessment - 1) natural mortality; 2) stock-recruit relationship; and 3) stock structure.						
Major Sources of Management Uncertainty	Canadian catch (NB weir fishery) currently the only source of management uncertainty accounted for in buffer between ABC and stockwide ACL (uncertainty re. discards and state waters catch also considered, but not accounted for recently since catches very low and accounted for in fixed gear set-aside and part of catch)						
How is the probability of overfishing addressed?	Currently, the FMP focuses on reducing the risk of overfishing - metrics available include OFL distribution, probability of exceeding OFL (assessment); MSE completed in Amendment 8 evaluated the probability of overfishing under various control rule alternatives.						
What is the consequence of overfishing?	If F exceeds the target F or F MSY, legal mandates apply. If overfishing occurs, fishery yield would be reduced in the following year(s). In the short-term, B would be reduced. Long-term impacts on other species/ecosystem of prolonged overfishing was examined in MSE in Amendment 8.						
How are expected net benefits to the Nation currently measured/evaluated?	Yield (mt and \$); limited data on costs						
Interactions with Other Fisheries/Stocks, Bycatch Issues	-Atlantic Mackerel (southern New England/Mid-Atlantic fishery overlap); -Northeast Multispecies, especially haddock (GOM and GB haddock catch caps for midwater trawl vessels); -River Herring and Shad (RH/S catch caps by gear type and area) -Direct linkage to lobster fishery (bait) and othersubstitute bait fisheries like menhaden						
Ecosystem Considerations: Trophic Interactions	Important forage for fish, mammals, seabirds; Diet and consumption considered in M assumption in stock assessment; -Herring's role as a consumer and competitor in the ecosystem -Concerns about localized depletion of herring schools, addressed in Amendment 8						
Ecosystem Considerations: Habitat	OHA2 evaluated risks on herring EFH- spawning measures in place in GOM and under consideration in FW7 -MSA language re. habitat of prey species (EFH)						
Ecosystem Considerations: Climate	Climate change may be affecting important prey/forage species for herring (calanus); vulnerability considered low to temperature change; distribution of species does not appear to be changing significantly due to climate change						
Other Important Considerations/Notes	-Sub-ACLs are allocated to reduce the risk of overfishing one of the stock components (inshore/offshore) -Important overlap with Canadian (New Brunswick) weir fishery - all catch assumed to come from inshore component of Atlantic herring stock, accounted for in management uncertainty buffer between ABC and ACL. -ASFMC Spawning Restrictions apply seasonally in inshore GOM to reduce risk of impacting spawning herring, and days out and weekly landing limits used to spread effort over season.						