## 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-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
Overfishing not occurring. Catch is 87.9% of ACL in 2018, 83.8% of ACL in 2019, and 78.4% of ACL in 2020.

## 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); observer coverage and other monitoring/reporting requirements; measures to address net slippage

## Catch, Revenues, and Variability
Total catch averaged 62,500 mt from 2011-2020, with a high of 95,700 mt in 2013 and low of 9,600 mt in 2020. The annual average price of Atlantic herring increased from about $300 in 2015 to peaking at $750 per

## 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 average landings (2011-2020) are: Portland, ME, Gloucester, MA, Rockand, ME, New Bedford, MA, and Narragansett/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 2022 Assessment - missing 2020 survey data, recruitment, natural mortality, and 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). For six of the last ten years final landings of herring exceeded what the transfer threshold was set at.

## 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)

## Mathematical Model
\[ F = \frac{OFL \times B}{\text{Current Year}} \]

## Management Track, June 2022
Atlantic Herring FMP Assessment Model, ASAP Model, 2021 Statistical Age-Structured Model

## Stock/Age
Overfishing? Overfished? In Rebuilding Program? OFL ABC/ABC CR ACL ACT
Yes: 5 year rebuilding plan, 2022 through 2026

## OFL
<table>
<thead>
<tr>
<th>Assessment Model</th>
<th>Terminal Year</th>
<th>Description of Assessment Model</th>
<th>Overfishing?</th>
<th>Overfished?</th>
<th>In Rebuilding Program?</th>
<th>OFL</th>
<th>ABC/ABC CR</th>
<th>ACL</th>
<th>ACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASAP Model, 2021</td>
<td>Statistical Age-Structured Model</td>
<td>No/Yes (2022 assessment)</td>
<td>Yes</td>
<td>5 year rebuilding plan, 2022 through 2026</td>
<td>Fmax = OFL x B CURRENT (F_MSY, F_OFL, or F_MSY depending on stock status) 23,423 mt in 2021 26,292 mt in 2022 44,600 mt in 2023 F_MSY-proxy = 0.5 (2022 assessment)</td>
<td>When biomass is &gt;0.5 for the ratio of SS/SSB/MSY, F_MSY = 80% of F_MSY. 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 8,767 mt in 2023</td>
<td>ABC - Management Uncertainty, determined by Council; Stockwide ACL = U.S. OY</td>
<td>N/A</td>
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<tr>
<td>Ecosystem Considerations: Trophic Interactions</td>
<td>Important forage for fish, mammals, seabirds; Diet and consumption considered in M assumption in stock assessment;</td>
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<tr>
<td>Ecosystem Considerations: Trophic Interactions</td>
<td>-Herring's role as a consumer and competitor in the ecosystem</td>
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<tr>
<td>Ecosystem Considerations: Trophic Interactions</td>
<td>-Concerns about localized depletion of herring schools, addressed in Amendment B</td>
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<tr>
<td>Ecosystem Considerations: Habitat</td>
<td>OHA2 evaluated risks on herring EFH - spawning measures in place in GOM and under consideration in FW7</td>
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<tr>
<td>Ecosystem Considerations: Habitat</td>
<td>-MSA language re. habitat of prey species (EFH)</td>
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<tr>
<td>Ecosystem Considerations: Climate</td>
<td>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</td>
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<tr>
<td>Other Important Considerations/Notes</td>
<td>-Sub-ACLs are allocated to reduce the risk of overfishing one of the stock components (inshore/offshore)</td>
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<tr>
<td>Other Important Considerations/Notes</td>
<td>-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.</td>
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<tr>
<td>Other Important Considerations/Notes</td>
<td>-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.</td>
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