New England Fishery Management Council
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# MEMORANDUM

**DATE:** December 5, 2019

**TO:** Council

**FROM:** Whiting PDT, Andrew Applegate chair

**SUBJECT:** **Conceptual approaches for rebuilding southern red hake**

The PDT considered the following conceptual approaches and did not prioritize or favor one over the others. Some could require further analysis to examine their viability and consultation with advisors and the committee. The Council could choose one or more of these approaches to be implemented on an incremental basis to achieve the rebuilding target within an acceptable time frame. It should also be recognized that the on-going research track assessment may change our perception of the stock as well as the biological reference points and proxy $B_{msy}$ value.

1. **Allow post-season AMs to take hold**. Catch during 2018 was 49% over the ACL, automatically triggering an adjustment to the in-season AM. This adjustment would reduce the possession limit from 5,000 to 400 lbs. when landings reach 41% of the TAL. This AM is intended to reduce the incentive to target and increase the incentive to avoid red hake. In theory, this should reduce catch but red hake is a non-target species for the majority of small-mesh fishing trips. A similar measure was however effective for northern red hake when post-season AMs were triggered several years ago. Northern red hake is currently not overfished, biomass being well above the target.

   This may be the best we can do right now, for the reasons given for other options outlined below. In most cases, rebuilding fish stocks is highly dependent on the strength of new year classes (recruitment) over which we have little or no control. Depletion of southern red hake seems to be mostly related to this, i.e. very little recruitment. Furthermore, as with many stocks, a strong relationship between spawning stock biomass and recruitment has not be shown and is probably more related to environmental factors, such as warming water conditions.

2. **Establish a year-round possession limit of 400 lbs. (or some other amount based on further analysis and/or input of advisors)** to prevent targeting and minimum discarding, until the stock is rebuilt. This approach places the burden of rebuilding on the directed whiting fishery and is likely to increase discards while having a limited effect on reducing catch.

3. **Reduce catch by a stairstep approach until sufficient increases in biomass are observed.** For reasons given below, the amount of needed catch reduction is uncertain, but it might be significantly reduced with low impact by identifying bycatch hotspots and

establishing regulations to reduce fishing in those areas or seasons through closures or requiring more selective fishing gear (if such gear exists). The majority of catch of southern red hake is bycatch, 76.4% of total estimated catch or 2.5 million lbs. in 2018. Most of this bycatch is associated with the small-mesh fishery that targets whiting/squid and the scallop fishery. Thus, measures to reduce bycatch as much as practicable may be the most effective approach to reducing catch to allow stock rebuilding, although the effect on rebuilding potential would not be estimated through this ad hoc approach. The objectives and milestones associated with this approach may be too broad or imprecise to be acceptable.

4. **Develop a biomass-based control rule**, which may or may not be based on estimated productivity and rebuilding potential of southern red hake. The basis for such a control rule is very likely to be relatively weak, because the stock dynamics is uncertain. The dynamics of catch and biomass is quite variable and doesn't necessarily make sense. The reference point is a survey-based proxy from 1980-2010, a period that was characterized as being a stable period but was anything but stable. Up until recently, overfishing has not occurred yet biomass declined below the overfished threshold. The existing proxy reference points may not be applicable in a contemporary regime of warming water temperatures and stock structure is uncertain. A benchmark, analytical assessment is scheduled for spring of 2020, which may or may not be conclusive on these issues. Until these issues are resolved, developing a control rule on the basis of stock dynamics would be a fool's errand. The stock structure research track assessment could change our perception of the stock(s) and its productivity. It would make sense to follow this approach as a follow on action, following the research track assessment.

5. **Estimate a maximum exploitation rate to rebuild within 2x mean generations** (see witch flounder approach below). Many of the life-history parameters associated with this approach have not been estimated because of a lack of aging and estimated growth rates. The rebuilding approach for witch flounder was possible because it was partially based on a prior analytic assessment, which allowed the Council to estimate life history parameters. In the case of southern red hake, natural mortality is very uncertain and potentially variable. Stock recruitment relationships have not been analyzed. This approach would require the Council to make some strong assumptions that current analyses cannot support.

## Witch flounder example rebuilding control rule

4.1.1.3.2 Option 2: Revised Rebuilding Strategy for Witch Flounder (*Preferred Alternative*)

The witch flounder assessment is based on an empirical approach that does not consider age-structure. As such, a projection cannot be calculated for this stock. Therefore, Tmin when F=0 is undefined and could be less or greater than 10 years. Without a measurable Tmin, no direct methods for estimating Tmax are available (see Appendix III).
The Council considered a range of options for a revised rebuilding strategy for witch flounder. The Council recommends Frebuild is an exploitation rate of 6 percent (or otherwise determined in a future stock assessment) and Ttarget is 23 years – rebuilding by 2043, as the *Preferred Alternative.* This strategy is within the range analyzed under Option 1 and Option 2.

The rebuilding options assume no changes to the FY2018-2020 ABCs that were previously recommended by the SSC, and adopted by FW57Specifically, the SSC stated " the justifications for this catch advice which uses a recent exploitation level of 6% was that there is a recent, strong year class that will allow for rebuilding. This signal is corroborated by other sources of information external to the stock assessment." By comparison, for stocks with projections under the groundfish ABC control rule, most groundfish stocks would be expected to rebuild in 10 years when fishing at 75%FMSY. For most of these stocks, rebuilding was not achieved as previously planned despite application of the control rule. Additional factors for setting $T_{target}$ were considered for the sub-options as discussed below, for a range of $F_{rebuild}$ options. By comparison, a lower exploitation rate could increase the chance of rebuilding the stock.

Sub-Options: - *$T_{target}$ is undefined, choose $F_{rebuild}$ as an exploitation rate less than or equal to 0.06.*
A. For witch flounder, $F_{rebuild}$ is an exploitation rate of 5.9 percent and $T_{target}$ is undefined.
B. For witch flounder, $F_{rebuild}$ is an exploitation rate of 6 percent and $T_{target}$ is undefined.

*Rationale*: Fishing mortality of zero for witch flounder is unrealistic given the multispecies nature of the groundfish fishery, as witch flounder is managed as a unit stock. Therefore, consistent with NS1, additional factors were included in the development of these options. $T_{target}$ of undefined would recognize the uncertainties in setting a rebuild by end date. First, biologically, witch flounder are a long-lived, slow-growing, late-maturing species (Cargenelli et al., 1999), which suggests rebuilding may take longer than 10 years. Second, signs of a relatively large 2013 incoming year class were detected in multiple surveys in the recent stock assessment, which could indicate some rebuilding is possible for this stock. These fish should mature between 2017 and 2019, which may promote future stock growth. However, signs of an additional large incoming year class were not evident in the stock assessment. Therefore, a $T_{target}$ of 10 years may be too short given their life history. Without a mechanism to determine if witch flounder is rebuilt, a $T_{target}$ of undefined would acknowledge the biological uncertainties in the current stock assessment of witch flounder. A recent examination of the yield-per-recruit analysis completed in the 2017 assessment suggests a mean generation time of 11.3 years at F=0. Following NS1 guidelines, two times the mean generation time results in 23 years (11.3 X 2 = 22.6, rounded up to 23), and was used as a basis within the options under consideration.

Consistent with the M-S Act requirements, the *Preferred Alternative* would set a time period for rebuilding that is as short as possible, taking into account the status and biology of the stock and the needs of fishing communities. Given the biology of this species, uncertainties due to the lack of an assessment model for this stock, truncation of the age structure of this stock, the reduction in the number of older fish in the population, and the negative impacts to communities of setting F=0 for this stock as part of a multispecies fishery, it is reasonable to set the rebuilding time at TMAX. This rebuilding program is based on the best scientific information available at this time because there is no assessment model that can provide numerical status determination criteria.