MEMORANDUM

TO: Marine Fisheries Commission

FROM: Dr. Louis Daniel
Division of Marine Fisheries, NCDENR

DATE: Jan. 22, 2015

SUBJECT: 2014 Southern Flounder Stock Assessment

The 2014 southern flounder stock assessment was developed after a thorough review of available data and current southern flounder research as well as careful deliberation by the division's Southern Flounder Plan Development Team. The stock assessment represented the best science and data available for the N.C. stock, while maintaining continuity with earlier assessments of that stock. For consistency with the previous southern flounder stock assessment, the same statistical catch-at-age model was used; however, a more robust program capable of handling a wider range of data sources was selected. Several updates to the assessment data were also incorporated, based on new southern flounder research related to reproductive ecology, and data (genetic, otolith morphology, and tagging information) that show significant mixing throughout the South Atlantic population that likely occurs during spawning and recruitment. Available modelling approaches could account for stock mixing during recruitment, but no satisfactory approach was found to account for adult mixing during spawning, as adult movement rates are unknown.

Division stock assessments are reviewed by a panel of three independent reviewers. These reviewers are each experts in stock assessment or the biology of the species in question, and the peer review process assures that data and methodologies used to assess N.C. stocks represent the best possible science and information. Three experts reviewed the 2014 southern flounder stock assessment: Drs. Steve Midway (assistant professor, Coastal Carolina University), Erik Williams (chief, Sustainable Fisheries Branch, National Marine Fisheries Service, Beaufort), and Genny Nesslage (senior stock assessment scientist, Atlantic States Marine Fisheries Commission). Dr. Midway accepted the assessment for management based on the treatment of the species' biology; however, he noted that he was unable to evaluate the stock assessment model itself because he is not a stock assessment scientist. Reviewers indicated that all appropriate data sources were considered and that the model selection was appropriate for the available data; however, Drs. Williams and Nesslage noted that the biology of the species and available data did not permit the use of traditional stock assessment models for determining stock status of southern flounder in N.C. waters. Most importantly, each reviewer noted the recent evidence for stock mixing throughout the South Atlantic and unknown movement rates. The use of traditional stock assessment models requires that all losses from the stock be accounted for, but migration rates to and from N.C. waters have not been quantified; furthermore, the fraction of N.C. recruits originating from South Carolina, Georgia, or Florida waters is unknown. These concerns cannot be addressed with a stock assessment that only includes southern flounder in N.C. waters and would require a regional assessment approach. Another significant problem noted by Drs. Williams and Nesslage was that fishery-independent indices of abundance showed no trend over the time period assessed, 1991–2013, and some indices appeared to show conflicting patterns. Since traditional stock assessment

models rely on fishery-independent indices of abundance to track population status over time, conflicting survey information and low data contrast made it difficult to accurately fit a traditional model. Therefore; the 2014 southern flounder stock assessment was not accepted for management by the division due to legitimate and substantial concerns raised by the peer reviewers, concerns with which the division agrees.

The original Southern Flounder Fishery Management Plan was adopted in 2005 to end overfishing and rebuild the stock. The purpose of the 2014 stock assessment was to determine if those goals had been met in the set time frame. The fact that the stock assessment was not accepted for management provides no answer as to whether those 2005 goals were appropriate or met. Consequently, in the absence of a quantified estimate of the overfished and overfishing condition, N.C. Division of Marine Fisheries Management Policy 2014-1, "Rebuilding Schedules, implementing G.S. 113-182.1 (b)5) and (b)(6)" does not apply. This policy addresses the statutory requirements to set a time period to end overfishing within two years and to set a time period to rebuild the stock within 10 years from the time a fishery management plan is adopted.

While the current southern flounder stock assessment model cannot be used for management and timelines cannot apply, much information exists to manage southern flounder in North Carolina, and some of that information is troublesome. Of particular concern is the combination of large numbers of immature fish in the catch and evidence of declining recruitment since the 1990s that may result in the need for further management measures.

Given the importance of the southern flounder fishery, alternate approaches will be developed in lieu of a traditional stock assessment. The division's Southern Flounder Plan Development Team is currently developing an analysis of trends in fishery performance, abundance, and stock productivity. The trend analysis will employ the Traffic Light approach, used in the current Blue Crab Fishery Management Plan, to provide guidance for management of southern flounder in N.C. waters.