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1		**Version:**	Supplement

Title: Addendum to Technical Document 13 "Selection of a Prior for Mixed Stock Analysis"

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Date: September 23, 2011

Summary of discussion of prior choice

Technical Document 13 was presented to the joint Advisory Panel (AP) and Technical Committee (TC) on September 21, 2011 in Anchorage (see attached file, slides 1 – 40). TC members present included Robin Waples, Milo Adkison, and Tom Quinn. Representatives were present from all AP members with the exception of Kawerak (Charlie Lean was there as a member of the public).

During and after the presentation comments from AP and TC members included:

1) Request for a sensitivity analysis to investigate effects of the choice of priors on the estimates.
2) Some interest in using external priors (biology-based and expert opinion). E.g,
    a. Distance from fishery (Quinn)
    b. Use existing allozyme and other data (Martin)
    c. Use the "in" and "out" approach, maybe add another layer (see attached file, slides 41-49) (Eggers, Barrett)
3) Some interest in using internal priors (information from related strata). E.g.
    a. Hierarchical prior (Adkison)
    b. Use mean stock composition either across-years or within-years, depending on where variation is the lowest (Waples). **Note:** Be careful – not all fisheries have the same properties – some vary more within year, among temporal strata and other varied more among years within temporal strata (Witteveen)

During the meeting, Jim Jasper agreed to perform a sensitivity analysis overnight. Results for this analysis were not available in the morning, but ADFG presented an approach to selection of priors based on comments from the previous day (see attached file, slides 50 – 70).

Three criteria for selecting priors were set:
1) TC approval of the process or numbers;
2) the approach must be practical to implement;

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33   3) AP approval of the process or numbers including;
34   a. Understanding and satisfaction with the process or numbers and
35   b. Consensus on the process or numbers.
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37   **Proposed method**
38 Keeping these criteria in mind and incorporating comments from the TC, a new approach was developed
39 and presented. This approach involves four steps:
40   1) Within each fishery, determine whether variation is lower within years across time strata or
41   across years within time strata using F_{ST} ;
42   2) Calculate composition estimates for the combined strata groups with the smallest inter-strata
43   variability, excluding the first stratum for each set;
44   3) Use these estimates for the priors in the first stratum for each set;
45   4) Use sequential priors thereafter within each set of strata.
46 This process has been schematically presented in the attached file (slides 56 - 66).
47
48 The advantages to this method are:
49   1) It is objective,
50   2) It does not require consensus on a set of numbers to be used for each prior for each fishery,
51   3) It is fairly simple to implement, and
52   4) It addresses differences in the patterns of variation within each fishery.
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54 At the joint AP/TC meeting, AP members approved this method pending final review by the TC. If this
55 process is determined to be adequate by the TC, it will be implemented by the Department for WASSIP
56 fishery estimates. If the process is acceptable, but requires minor modification, the modified process will
57 be implemented for WASSIP. If the process is not adequate, the TC will provide suggestions to
58 substantially improve it, and the new methods will be resubmitted to the AP for final approval.
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60   **Questions for Technical Committee**
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62   1) Is this method to determine an informative prior reasonable and acceptable for the
63   purposes of WASSIP?

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65   2) Of the options explored to date is this the best method? Are there better ways to
66   determine the starting priors? If so, are these better ways so substantially better that you
67   would recommend that they be implemented?

68 **Technical Committee review and comments**

69 **Addendum to Technical Document 13: Selection of a Prior for Mixed Stock Analysis**

70 *The comments below are based on TC review of Technical Document 13 and the addendum*

71 *prepared by ADFG staff (sent by email 26 September), as well as discussions at the September*

72 *21-22, 2011 meeting.*

73 **Comments on the addendum**

74 We believe the proposed method in the Addendum is a reasonable way to develop priors for A1. It

75 should lead to better results than simply using a flat prior (1a or 1b). The first step is to quantify

76 variation in stock composition estimates both across years and across seasons within years. This might

77 have to be done separately for each fishery. It seems logical that if stock composition estimates from

78 different strata are strongly correlated, then allele frequencies in the overall mixtures being compared

79 should also be strongly correlated. Quantifying allele frequency differences among mixtures using an

80 Fst-like quantity should be simple and informative.

81 As noted above, an optimal method would use some type of hierarchical approach to maximize use of

82 all available information, but most of these options are not feasible for the current application. One

83 option that might be considered if time is available would take advantage of the fact that Fst is a type of

84 variance and use the Fst values calculated as proposed in the Addendum to weight estimates from prior

85 years vs prior seasons within years. However, we suspect that the majority of the improvements in the

86 priors would be achieved by use of at least some prior stock composition information (as proposed in

87 the Addendum), and any marginal improvements from a more sophisticated hierarchical approach

88 would be relatively small. Given the tight constraints on time, we think it is reasonable to allow ADFG

89 staff some flexibility in implementing the proposed method within the general framework outlined in

90 the Addendum.

91 **Summary:** The TC concludes that the approach outlined in Technical Document 13 and the Addend is a

92 reasonable approach to obtaining priors under WASSIP. Once results of the sensitivity analyses are in, it

93 should be possible to begin to evaluate the marginal benefits from incorporating additional sources of

94 information into the priors. However, that is a longer-term project.

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96 WASSIP Technical Committee

97 Milo Adkison, Tom Quinn, Bruce Weir, Robin Waples (Chair)

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